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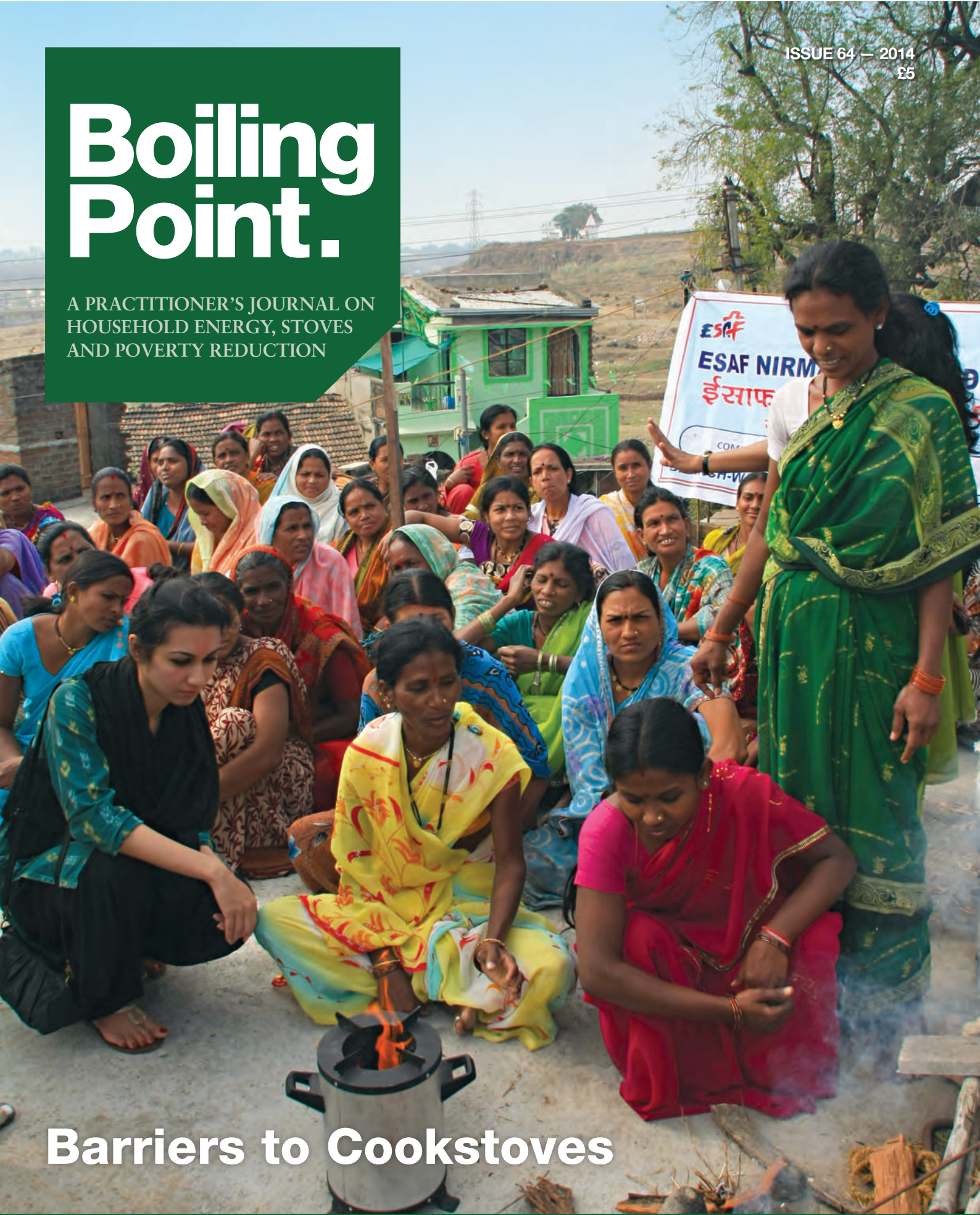
A PRACTITIONER'S JOURNAL ON HOUSEHOLD ENERGY, STOVES AND POVERTY REDUCTION



Barriers to Cookstoves

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Why and how women must be integrated throughout the value chain – p20

plus toolkit on stakeholder analysis, helpline responses on testing stoves, sponsor news and more...

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Boiling Point is a practitioner's journal for those working with household energy and stoves. It deals with technical, social, financial and environmental issues and aims to improve the quality of life for poor communities living in the developing world.

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Cover photo: Ashden Award winner Greenway Grameen (Source: Martin Wright/Ashden)

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Editorial

ISSUE 64

Barriers to Cookstoves

Picture 1: Editors of Boiling Point 64 meet a young woman lighting a stove with plastic, Livingston, Zambia (Source: Karima Hirji)

Boiling Point issues have, for several years, explored and explained the health, environmental and gender factors associated with the use of traditional stoves and the burning of solid biomass. As new research continues to emerge, articles in our issues reinforce the belief that improved cookstoves (ICS) are designed to burn solid biomass more cleanly and efficiently, with positive effects on health, the environment, education and gender roles. However, an understanding and acceptance of the positive benefits of ICS does not and has not led to a successful uptake of clean cookstoves in many countries. Barriers to cookstoves have therefore been researched and discussed extensively. Yet despite the plethora of global research and practitioner experience, barriers to the uptake of ICS remain an insatiable topic.

Editors of this issue have recently returned from Zambia, as part of the EPSRC funded Barriers Project, where the complexity of ICS uptake was witnessed firsthand. Whilst visiting a local ICS producer in Livingstone, we met a young woman next door who was preparing to light a charcoal 'Mbaula' (the local name for stove) with the aid of a bright blue plastic bag. The woman was intrigued by our discussion on negative health implications associated with burning plastic, such as the harmful effects on her chest and reproductive system. She then agreed to replace the plastic with surrounding leaves and grass to start the fire. Despite our best intentions, after six matches and no fire, she returned to the plastic and her stove was lit within minutes, illustrating that our ideas are not necessarily the most convenient or appropriate for the user. When asked about the rocket stove production next door, the young woman confidently stated that it was faster to cook with and easier to use. However, when asked why she doesn't use one, she shrugged her shoulders and said she did not know. Perhaps, in this case, the barriers to ICS uptake are financial or that the young woman is not the decision-maker in her home. Whatever the reason, it was suddenly clear that some barriers to ICS uptake are perhaps undiscovered and far more complex than imagined. Our experience highlighted the continued significance for research, analysis and understanding of the barriers to ICS.

Boiling Point 64 discusses barriers from many countries including Ethiopia, Haiti, India and Cambodia. First, the University of Nottingham start to unpack the wider understanding of ICS amongst different actors and begin to categorise and explain the barriers in relation to their project that aims to better understand the barriers to the introduction and uptake of ICS in Southern Africa. Other theme articles in this issue compare and contrast regional barriers, report on ICS programmes that have successfully incorporated community participation, and specifically address the role of women when addressing barriers to ICS uptake. Posed from the field, a Helpline question on testing and certifying ICS is addressed by experts from both India and Kenya, and Eco Ltd features a Stakeholder Barrier Analysis in the Toolkit section of this issue. Interviews with Kirk Smith, Professor of Global Environmental Health and HEDON Patron, and with Brady Luceno, Assistant Director of Project Gaia, sheds light on further barriers such as fuel supply, ICS standards and indoor air pollution targets.

As always, this issue also features general articles including a report on the recent Sustainable Energy for All Forum, a summary of Practical Action's Poor People's Energy Outlook report and a special article from South Africa's Restio Energy on support for small businesses and entrepreneurs in energy access. Boiling Point 64 features news pages from several organisations, including the issue's sponsors: University of Nottingham, the Alliance, Stove*Plus* and GIZ, to whom we are extremely grateful for their support. To all of our 15 000 print copy and 21 000 online readers in over 100 different countries, we hope 'Barriers to Cookstoves' offers an insightful and educational exploration of the challenges and possible solutions to ICS uptake and beyond.

Karima Hirji (Boiling Point) and Charlotte Ray (University of Nottingham)

PEER REVIEWED

Theme

The introduction and uptake of improved cookstoves: Making sense of engineers, social scientists, barriers, markets and participation

Keywords: Improved cookstoves; Barriers; East Africa; Southern Africa; Market-based approaches; Participation

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Picture 1: A variety of improved cookstoves displayed at Jamhuri Energy Centre, Nairobi, Kenya

Drawing on the authors' previous experience, literature review and preliminary fieldwork, this article discusses some of the existing challenges faced when investigating improved cookstove (ICS) adoption and some of the current barriers that interfere with ICS introduction and uptake in East and Southern Africa. This article also discusses different methodological approaches that can be taken when addressing these barriers and how this can be incorporated within the Barriers project, an ongoing multi-disciplinary project investigating why ICS have had relatively little household or market penetration in Southern Africa in comparison to some countries in East Africa.

Stoves, engineers and social scientists: Match made in heaven or recipe for disaster?

The International Energy Agency wrote in 2006 that there were 2.5 billion people in developing countries (especially rural areas) that relied on biomass to meet their energy needs for cooking. They also continued that this figure would increase to over 2.6 billion by 2015 and to 2.7 billion by 2030 (OECD/IEA, 2006). The 2012 World Energy Outlook projected that "these numbers will have changed little by 2030" (OECD/IEA, 2012: 29). At the same time, the use of traditional 'open' cookstoves is fuel inefficient and is estimated to contribute around a third of global carbon monoxide emissions, with black carbon particles and other pollutants in biomass smoke thought by many to exacerbate global climate change (UNEP, 2006).

Since the 1970s, global concern about the energy crisis, deforestation, health hazards (more specifically indoor air pollution), and more recently climate change (in reference to greenhouse gases and black carbon), have put improved cookstoves (ICS) at the forefront of household energy solutions. ICS, designed to burn, predominantly, biomass fuels more cleanly and efficiently than traditional stoves, are one of the most prominent 'decentralised energy solutions' (UNDP, 2010) that have been promoted, mostly by Northern-affiliated international organisations.

With that in mind, however, "since the 1940s, efforts have been made by governments, international development organisations, and NGOs to increase the dissemination of efficient biomass cookstoves." (Anhalt and Holanda, 2009: 4). At the same time, the impact of many of these interventions have been short-lived "due to the inability of the programmes to meet the expectations and actual requirements of the users, a lack of long term development objectives, systematic institutional arrangements and appropriate local manpower development" (FA0, 1993: 5). In 2010, however, the then Secretary of State Hilary Clinton launched the Global Alliance for Clean Cookstoves (Alliance) as a new "public-private partnership to save lives, improve livelihoods, empower women and protect the environment" (GACC n.d.) and promote ICS globally - a development

which, according to Yee (2010), elevated the improved stove agenda 'from a public health backwater to a high place.'

Nevertheless, the idea of a cookstove intervention however highlights the differences in approach taken by engineers and social scientists, often with two different end results and a lack of interaction. For example, when faced with the task of altering the traditional 'open' cookstove, most engineering-based approaches tend to be design-led. After noting the inefficient use of biomass, the lack of suitable ventilation and the general disregard for health and safety, emphasis is placed on designing a new stove, complete with chimney, temperature control, automated ash collection and other 'essential' extras. The final product/ service is finally launched in the relevant market amongst bemused cooks (Clifford, 2014). Social scientists, on the other hand, tend to observe rather than directly engage. They will concentrate more on the person doing the cooking rather than the technology and ask questions relating to gender, culture, the wider geographical context etc. and more importantly will ask 'why' people are cooking in this way and what constraints exist to the adoption of ICS. Both of these stereotypes have their merits and their problems and this has resulted in a plethora of ICS interventions (especially in sub-Saharan Africa); many of which have had mixed results as the dominant techno-centric approach ignores subtle user needs, creating new social problems in the process.

The creation of the Alliance has raised global awareness of the importance of ICS technology, however, its aim to foster adoption of ICS to 100 million households by 2020 is ambitious and begs the question, improved for whom and for where?

What is the problem?

When we think of successful ICS initiatives in sub-Saharan Africa, the Kenya Ceramic Jiko (KCJ) stove most regularly comes to mind. Efforts to develop improved biomass stoves in Kenya date back to the 1970s (Sesan, 2011) whereby both governmental and non-governmental organisations developed, tested, and refined a cookstove that consumed less charcoal, reduced products of incomplete combustion and particulate matter, and reduced the proportion of income urban households were spending on charcoal. The KCJ was developed in 1984 (Kammen, 1995) and was successfully disseminated amongst urban households in Kenya. It has been widely accepted as it meets user requirements for affordability, portability and income generating opportunities and has been replicated in many African countries, albeit under different names (japa in Ghana and canamake in Rwanda).

Although the recent efforts of the Alliance and the 'success' of the KCJ have helped to promote ICS technology, there are still significant issues that need to be addressed. The uptake of the KCJ in rural Kenya was far less successful than in urban areas, for example; partly due to the fact that 95% of the rural population use solid fuels (GACC, n.d.) predominantly in the form of wood fuel rather than charcoal. Wood-burning stoves similar to the KCJ have been produced (such as the Maendeleo stove – Sesan, 2011) but have had less success due to factors such as cost, subsidies by various organisations and existing market conditions. It is essential to continue to understand why improved biomass stoves are not adopted by populations given that wood is the oldest and still the largest biomass energy resource used today (ibid). At the same time, recent hypotheses suggest that even the reduction in smoke achieved by the cleanest biomass burning stove would have little impact on health effects and there needs to be a complete shift by entire communities to alternative fuel sources away from biomass for there to be significant health gains (Smith, 2014).

The scale of success enjoyed by the KCJ and related ICS technology has not been replicated in Southern Africa. The 'barriers' to the uptake of ICS is a notable trend within the stove literature (Sesan, 2011; Watson et al., 2012; Akintan, 2014) which seeks to identify gaps to understanding how to achieve effective dissemination. The problem here, however, as Watson et al. (2011:2) note, is that there is already a large body of work regarding barriers to the dissemination/ adoption of modern energy services, however, "there is a highly uneven spread of coverage and a significant lack of high quality research". A simple internet search or the use of an institutional database will produce hundreds of search results listing, explaining, drawing on and critiquing various barriers to the introduction and uptake of ICS (please also refer to the News section of this issue of Boiling Point introducing a multi-disciplinary project investigating the barriers to ICS technology in Southern Africa). Barriers to the introduction and uptake of ICS are commonly referred to, but much more is needed in the way that we understand and attempt to overcome them. To provide a simple snapshot from a scoping trip to Kenya, Uganda and Tanzania and Malawi in April/ May 2014, such barriers include:

Financial barriers

The driving factor here is usually the cost of the stove itself although if the stove uses fuel other than wood (which is usually obtained free of financial cost in rural areas) this will have additional financial implications. Given that there is a lack of financial value associated with cookstoves (partly due to previous subsidy-led and donated approaches), end users (especially in rural areas) may be unable (particularly when looking at gender power relations and household dynamics) or unwilling to prioritise an ICS in favour of other needs. Additional financial barriers include limited access to capital by Small and Medium scale Enterprises (SMEs) for business development (such as credit, loans etc.) with the result that high interest rates and increasing cost of materials translate into higher stove costs for the end user.

Market barriers

A lack of demand for ICS amongst many potential users is a key barrier to their adoption. On the supply side, distribution, marketing and sales are the major barriers. Many artisans have

Picture 2: Duplicate ICS using poor quality metal cladding and painting clay to give it the 'fired' look sold in Jua Kali Market, Kisumu, West Kenya (Source: Charlotte Ray and Maria Beard, Barriers Project)

significant stocks of ICS but sales are irregular and their businesses are not necessarily sustainable. ICS distribution and marketing appear to have the least investment and systemisation, characterised by insufficient specialisation and development of ICS as standalone products. Also, producers, distributors and retailers do not necessarily have sufficient knowledge to effectively market their ICS products which ultimately hinders their selling capacity.

Quality barriers

This is a pressing issue in the sector at the moment (please refer to the Helpline section of this issue for more information). Many businessmen and women are reported to counterfeit high-quality ICS products and sell them in local markets at much lower costs (Picture 2). Consequently, quality is compromised and producers/ retailers of higher quality stoves (Picture 3) lose out both in terms of reduced sales and damaged reputations caused by customer dissatisfaction with the poor quality and longevity of the imitation ICS. The issue of quality, certification and standardisation of ICS is at the forefront of debate but questions arise regarding 1) the means to enforce standardisation and 2) the implications for local artisans if they need to pay to test their ICS products.

Political barriers

Biomass fuel tends to be neglected and their management is often ignored at government level as most national energy-related policies remain targeted at electrification. At the same time, policies that do encompass biomass are often predominantly related to forestry resources and are poorly coordinated with a distinct lack of communication between government ministries (such as energy, agriculture, forestry etc.). Bodies have been formed specially for ICS (e.g. Clean Cookstove Association of Kenya, Ugandan National Alliance on Clean Cooking, National Cookstove Taskforce Tanzania and National Cookstove Taskforce Malawi) incorporating a range of actors including government, NGOs, and private sector actors, but a lack of integration across sectors is said to create confusion among members, ICS producers and end-users.

Infrastructure barriers

Poor transportation links (inadequate road surfaces and insufficient vehicles) make it costly to produce, market and retail ICS products and are a cited as a major constraint by all members in the market chain.

Resource barriers: The availability of and access to ICS materials such as steel and clay is geographically limited and this in turn increases the cost of transportation and thus the cost of the stove. At the same time, although researchers have concluded that using wood as a fuel is not a primary cause of deforestation (FAO, 1997; Arnold et.al., 2006; Sesan, 2014), most rural populations still collect fuelwood in an unsustainable way with little regard for wider environmental risks and more immediate health concerns associated with wood burning.

Awareness barriers

SMEs in the firewood sector face difficulty marketing stoves due to low consumer demand, awareness and the low commercialisation of firewood in comparison to charcoal. At the same time, there are still a high number of rural communities that have not been reached, making the adoption of ICS much more challenging. End-users in urban areas also face obstacles as many are unable to tell the difference between a good quality ICS and a sub-standard one.

Socio-cultural barriers

These include the national, regional, and community geographical context, gender, age, ethnicity, family etiquette and, traditional community hierarchies. Such factors are commonly referred to in the literature but there has been little empirical work further investigating the socio-cultural issues that impact on the uptake of ICS and how addressing such issues might facilitate behavioural change. Many programmes make the assumption that socio-cultural factors are fixed and that a generic 'one size fits all' stove can be used in conjunction with these wider issues.

Market-based vs. participatory approaches: Shifting strategies?

Given the historical challenges from state/ subsidy led and donated ICS approaches (Barnes et al., 1994; Sesan, 2011), shifts have been made to more market-based models for stove dissemination. There is, however, evidence to suggest that the market-based model can undermine success in targeting the poor by causing cookstove prices to rise sharply, lowering employment prospects for artisans, and creating opportunities for brokerage and corruption (Simon, 2010).

Many ICS initiatives adopt a quantitative, technical approach (Troncoso et al., 2007) but recent studies have seen the benefits of adopting qualitative methods to explore the non-technical dimensions of improved stove dissemination (Sesan 2011, 2012). Indeed, there are lessons to be learnt from sanitation initiatives emphasising the need to combine technical or 'hardware' interventions with a broader awareness of wider 'software' (socio-economic, cultural) influences on behavioural change (Black and Fawcett, 2008). As cooking practices and taboos tend to vary over space and according to local culture, factors such as socio-economic status, ethnicity, age or gender may have a significant influence on both household energy preferences and whether a particular cookstove is likely to be acceptable to and adopted by households. In the sanitation sector, participatory approaches such as community-led 'total sanitation' (Peal et al., 2010) emphasise that environmental health problems are unlikely to improve unless everyone changes their toileting behaviour. They therefore focus on stimulating collective behavioural change while raising awareness of community-wide health

Picture 3: High Quality ICS produced by Keyo Women's group in Kisumu, West Kenya (Source: Charlotte Ray and Maria Beard, Barriers Project)

implications. Such approaches may also be relevant for ICS initiatives; especially given recent WHO evidence that individual households that adopt ICS will still experience household air pollution levels that are orders of magnitude above the WHO guidelines for PM2.5 (WHO/PHE, 2014) due to smoke drifting between houses in the wider community. This suggests that there needs to be community-wide change in regards to ICS uptake rather than just at the individual household level.

Lessons can also be learnt from the adoption of other technological innovations. The rapid diffusion of mobile phones in the global South, for instance, is an example of how technological solutions have been disseminated through market-based approaches but have been able to incorporate community elements, giving them wider acceptability and creating greater demand. If ICS became associated with higher levels of social status and convenience in the same way that mobile phones have, or if women's cooking preferences had greater weight in household decision-making, the adoption of ICS technology might be improved significantly. This highlights the need to target the priorities of both men and women at all levels of the stove value chain.

Conclusion

Many of the key barriers to the introduction and uptake of stoves in sub-Saharan Africa have been identified, although it is also not clear why the uptake of ICS in Southern Africa has been much slower. Consequently, there is a need to identify the reasons for the success of stove programmes such as the KCJ, as well as the challenges that ICS programmes and products still face in other geographical areas. Incorporating a wide range of actors and combining both market and community based approaches may assist in unravelling current barriers to wide-scale ICS adoption and identifying how Southern African countries might develop a more structured and effective dissemination process.

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PEER REVIEWED

Adoption of cleaner cookstoves: Barriers and way forward

Keywords: Cookstoves; Biomass; Energy access; Barriers

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Picture 1: Women cooking Injera in an improved Mirt stove in Arse Negalle, Ethiopia

Globally 2.6 billion people, representing around 38% of the total population, depend on solid biomass fuels to meet their basic energy needs for cooking. While rural communities are shifting to modern fuels such as LPG and electrical energy for cooking, the International Energy Agency estimates that, in the absence of new policies, the number of people relying on solid biomass will increase to over 2.7 billion by the year 2030 because of population growth, calling for a higher adoption rate of improved biomass cookstoves. This article highlights the key barriers to adoption of improved cookstoves (ICS), sharing experiences from the field in South Asia and Sub-Saharan Africa. More emphasis on technical design of stoves to achieve higher thermal efficiency and lack of sufficient attention to consumer perspectives such as user-friendliness, purchasing capacity, income variability of rural households as well as to local capacity development of market players and stove builders create the dissemination challenge. The article suggests that stronger stakeholder partnerships, knowledge sharing, and satisfaction of user requirements through appropriate designs and diversified financing options will be required for a rapid growth of supply and demand of ICS.

Introduction

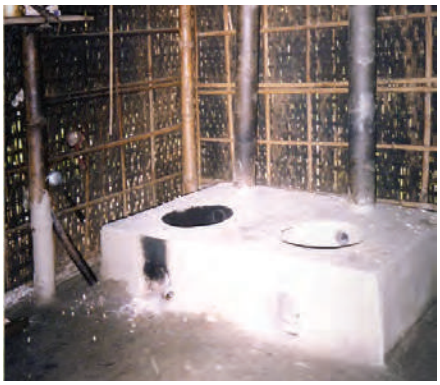
With 2.6 billion people globally relying on solid biomass fuel such as fuelwood, charcoal, animal dung, shrubs, and agricultural residue for cooking, lack of cleaner fuels for cooking continues to be a critical issue (Pachauri et al, 2013). A vast majority of these people live in rural areas of South Asia and Sub-Saharan Africa. Although the Sustainable Energy for All initiative covers electricity and cooking energy access, there is little analysis of options or strategies for accelerating a transition to cleaner combusting cooking fuels or devices (Pachauri et al., 2013; World Bank, 2011). Many researchers argue that without new policies and strategies, the number of people relying on solid fuels for cooking will increase by the year 2030. The implications of these household cooking practices include severe health impacts, gender inequities, and local and global environmental change (Foell et al., 2011).

In India, the decrease in the consumption of solid fuels between the census of 2001 and the census of 2011 has been negligible. Together, the five states of Andhra Pradesh, Bihar, Madhya Pradesh, Uttar Pradesh and West Bengal account for nearly 50% of all households using solid fuel in India. According to the 66th round

Box 1: Example of technology barriers

In Bhutan, smokeless ICS were introduced as early as 1985. Given that Bhutan is a cold country, a major disadvantage of the smokeless cookstoves, as perceived by the users, was the limited room heating and lighting effect. Although these smokeless stoves can be regulated to have a better efficiency, it appeared that in practice rural people do not regulate the airflow, thereby having a high combustion of fuelwood for the heating requirement, and thus reducing its efficiency as most of the hot flue gas escapes through the chimney (Palit and Garud, 2010).The first author observed during field surveys that similar to many households in Bhutan, in cold hilly areas in India (such as the north-eastern region of India) and Nepal, the chimneys of smokeless stoves were dismantled to use the smoke for drying chili, fish and grains, eventually making the ICS traditional again.

In Kenya, cooking Ugali, which is the traditional food, requires continuous stirring and therefore stove stability is essential. However, many of the available metal stoves are made from a less thick steel with a smaller base and are unstable, making it difficult for the user to cook. In the case of Ethiopia, cooking Injera, the staple food, requires a wider flame (similar to dosa cooking in the southern region of India) and also consumes the maximum amount of fuel, Most of the available ICS however are not designed to provide this wider flame. A household thus has to buy two types of stoves for cooking Injera and curry, incurring additional expenditure and thereby restricting the procurement of ICS.



Picture 2: Improved smokeless stove implemented under NPIC in India

of the National Sample Survey, annually about 0.35 ton of firewood and chips per capita are consumed in rural households in India (NSSO, 2011). The per capita fuelwood consumption in the Himalayan country of Bhutan is even higher at 0.85 ton annually (Palit and Garud, 2010). Similarly, 79% of the population in Sub-Saharan Africa use biomass as their main source of energy for cooking with annual average consumption of 0.8 ton of fuelwood per capita (Adkins et al., 2012).

While the need for action is clear, the technical barriers and institutional challenges to solve this problem remain daunting, and there are a number of areas where further work is required.

This article, based on an extensive literature review, stakeholder discussions and authors' field experiences, discusses the clean cookstoves programmes and attempts to highlight the key barriers to adoption of improved cookstoves (ICS) in South Asia and Sub-Saharan Africa. Furthermore, the article suggests some key measures that might be helpful to improve the user acceptability of ICS and enhance their dissemination.

Clean cookstoves programmes

Recognising the social, environmental and economic benefits of ICS, globally more than 160 ICS programmes were running at the end of the last decade, ranging in size, scope, type of stove disseminated, approach to technology design and dissemination and financial mechanisms (Gifford, 2011). Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) has been at the forefront in implementing ICS programmes in Sub-Saharan Africa and in South Asia. In India, the Ministry of New and Renewable Energy (MNRE) began implementing the National Programme on Improved Cookstoves (NPIC) for providing clean energy, however the programme was discontinued in 2002. At the time of discontinuation around 33.8 million ICS (around 27% of the target) had reportedly been distributed in rural India. Palit (2005) observes that one of the success stories of NPIC is from the state of West Bengal. This success can be attributed to the crucial role played by village level institutions, school teachers, youth clubs and women's groups for motivation, promotion and monitoring of the ICS dissemination. While India has a strong government based subsidised programme for ICS, in the case of Africa, delivery through entrepreneurs are far more common.

The majority of ICS initiatives, either in South Asia or in Africa, seem to focus on developing new stove designs, mass scale production, marketing and providing subsidies/incentives for wider dissemination, and not on socio-cultural acceptability issues. Balachandra (2010), citing the example of India, observes that the ICS programmes were technology-focused with dissemination being the only objective and numbers deployed as the metric for measuring success. Further, policy makers have failed to influence a shift from biomass-based cooking in rural areas, and even the limited success achieved is confined to higher income rural families. While India launched the National Biomass Cookstove Initiative in late 2009, incorporating the lessons learnt from prior policy initiatives, it has not been well organised, nor has it received adequate funding in comparison with the National Rural Electrification Programme. The thrust on electricity access is also corroborated by the fact that almost half of developing countries have set targets for access to electricity, while very few have set targets in relation to accessing cooking fuels or ICS (UNDP and WHO, 2009).

Barriers to adoption

Providing access to modern cooking fuels and, more importantly, affecting a transition towards modern energy at the household level, remains a challenge. The factors governing a household's decision to use a particular fuel are very different from the case of lighting. These factors also differ from one region to another, making the goal of energy access for cooking more challenging. While affordability and the availability of a sustainable supply of cooking fuel is important, understanding the gap in behavioural aspects of household energy use is also critical in addressing these barriers. Although many barriers may be location specific, there are some common key barriers which seem to affect the dissemination in South Asia and Sub-Saharan Africa.

1. Overemphasis on technology, under emphasis on the user-friendliness

Most of the ICS projects across South Asia and Sub-Saharan Africa seem to be technology-centric, focused on good designs from an engineering and designer perspective, and on improving the large scale manufacturing process (Ruiz-Mercado, 2011). Many a time, the products that were disseminated, hardly considered any input from the target users in the design aspect and therefore, were not used by consumers or were ill-suited for actual cooking. Gifford (2011) observed that a "stove too small to fit all pots" was the most common complaint amongst stove users.

In India, though millions of ICS have been disseminated under the NPIC, studies indicate that the key barriers to their introduction are both technical and social (Gopalan and Saxena, 1999). Even the best fixed ICS leak smoke into the room or are culturally not acceptable.

Box 2: Determinants for scaling up cookstoves dissemination

To address the barriers to scale up both the supply and demand for cookstoves, adequate support will be required to (i) facilitate partnerships between stakeholders, share knowledge and create extensive awareness on ICS (ii) understand users' requirements and develop multi-fuel ICS with flame control mechanisms (iii) promote acceptable minimum standards for stove performance, and (iv) provide and promote a wider base and diversity of financing options available to consumers as well as the entire supply chain.

The users thus tend to modify the design making it traditional again. For example, it was observed in the state of West Bengal, India that the pothole and mouth of the mud ICS are always adjusted by users to accommodate vessels of different size and to ensure that both fast and slow cooking can be done. In the early morning hours users can do fast cooking to prepare food for household members that go for work and in the evening, they can do slow cooking while doing simultaneous household chores. Without proper flame regulators in most of the natural draft ICS, controlling the flame is not possible. In case of forced draft ICS, while air supply can be regulated to provide remarkably clean burning, they require smaller wood chips (Raman et al., 2013). Users at large find the fuel processing tedious and in the absence of a market for processed fuel in rural areas, it restricts the adoption of these ICS. Further, most of the ICS are designed to use one type of fuel, mostly firewood, for optimum efficiency, while rural users prefer stoves that can take multiple fuels (such as twigs, leafs, straws and cow dung cakes) that are available in these areas.

While we place much emphasis on stove designs to achieve the highest thermal efficiency, very often we tend to neglect the kitchen design. Improving efficiency can help in reduction of fuel consumption, and to some extent, in reduced emission of particulates. But without proper kitchen ventilation, the released pollutants remain inside the kitchen and thereby exposing the occupants (Palit, 2011). While the major role of ventilation is to induce outside air to dilute the kitchen air so that pollution concentration remains low, field experiences show that in many cases the cookstove is installed away from the window or the kitchen does not have any ventilation at all, allowing smoke to accumulate in the room.

2. Lifestyle change required to use improved cookstoves

Cooking forms a major part of a rural lifestyle, which includes gathering of wood with other women and cooking traditional recipes passed through generations. While changes in lifestyle may bring significant benefits such as doing income-generating activities in the time saved on wood gathering, these changes are not easy to adopt. It can be difficult for women to adjust their cooking methods to a new device and in many cases the family may even find that the food may taste different. An evaluation of the Village Energy Security Programme in India clearly indicates that communities were not inclined to use ICS because they were used to cooking on wood and were reluctant to change their cooking practices (Palit et. al., 2013). In a classic example of fuel stacking, many Indian households with LPG connections still use firewood based cookstoves, especially for bread making, due to the perceived 'better' taste of the food and, to some extent, the affordability issues. LPG is used only sparingly for quick cooking such as making tea (Joon et al., 2009).

Fuelwood savings seem to have low attractiveness in rural areas, owing to the easy access to supply from homesteads, agricultural fields or nearby forests. A study of the Millennium Research Villages in Africa by Adkins et al., (2012) indicates that fuelwood used by the majority of the households (79%) is acquired by collection. Poor rural households do not consider it beneficial to shift from biomass, obtained at zero cash outlay, to commercial cooking fuels such as kerosene, LPG or even processed biomass chips. The remote areas also provide low opportunity cost of labour and, in many cases, there is also minimal opportunity for cash income. Thus the savings achieved in terms of time and effort in biomass collection because of reduced biomass use in ICS, does not usually translate into tangible benefits given that users cannot always utilise the time for income generation activities.

3. Purchasing patterns by households

It is women who would benefit the most from the ICS but in rural households husbands usually control household spending. It therefore becomes difficult to justify the financial savings to men because wood is obtained at zero cash and collecting it is considered as women's work. Furthermore, many studies indicate that while the cookstove is targeted as a time saving device, in practice, it has been observed that many ICS do not actually take less time to cook as compared to traditional stoves. A user can put in firewood in traditional stoves depending on the heat requirement, whereas this is restricted in ICS for ensuring optimum fuel burning rate for high thermal efficiency. Thus, instead of features such as lower consumption of fuelwood or lower time to cook, features such as ability to keep the utensils clean (which will also ensure reduced time to clean utensils) might be a more useful strategy to promote ICS. Palit (2005) observes from the study of NPIC in West Bengal, that the primary benefit perceived by users is cleanliness of the kitchen because of smoke removal through the chimney followed by health benefits, timesaving and lastly fuel wood savings. Similarly a recent study on a forced draft metal stove, conducted by TERI researchers in the state of Uttar Pradesh in India, revealed that less smoke followed by attractiveness of the cookstove were considered on a higher priority than scarcity of firewood for adoption of ICS. In many cases, the health benefit of clean cooking fuels is not valued by poor beneficiaries because of lack of awareness. Electricity, on the other hand, is regarded as an aspirational demand which can also give people the opportunity to earn more. Cleaner cooking devices, however, are considered as an expense and thus avoided.

4. Income variability of end-users and limited stove financing options

Social goods and services are targeted at the base of the pyramid population, especially those living under US$ 2 per day. However, for subsistence farmers income fluctuates with the season, with major income coming in at the end of harvest. Positioning strong marketing efforts to drive sales during this time period may be more fruitful than promotions throughout the year. In

Picture 3: Women collecting firewood from the forest in a village in Arunachal Pradesh, India

Picture 4: A stove dealer demonstrating a portable stove in Oloitoktok, Kenya

Picture 5: A user cooking food in a forced draft stove in a village in Meghalaya, India

Ethiopia, the first author observed during field visits that households were procuring Mirt stoves (for Injera baking) and Rocket stoves during the harvesting season. They were, however, reluctant to procure the same when the sowing season was on as they wanted to use the limited cash to buy fertilizers and seeds for farming.

The price of most ICS varies from US$ 15 - US$ 70, depending on type, quality and durability of the stoves. Poor households find it difficult to raise the money for a good quality and durable ICS in the absence of affordable financing mechanisms by rural banks. Wherever there are banks and micro finance institutions, the very small amount of the loan does not enthuse them to consider cookstove financing as a part of their usual business. The current stove financing options are sometimes rigid in their repayment structure and thus restrict the user to avail such financing options. Further, financial support is not always available to the entire supply chain, thereby restricting energy entrepreneurs in considering stove dissemination as a business venture.

5. Limited market players and stove builders in the rural areas

There is a wide variety of stove technologies on the market today ranging from basic ICS to advanced forced draft stoves. While there is a growing set of private actors and NGOs in the sector, the majority of them are small and have yet to scale up to meet the magnitude of the problem. There are a very limited number of trained technicians and stove builders in rural areas who can build improved mud stoves and also provide the necessary post installation maintenance, limiting the market for dissemination of ICS.

6. Knowledge gap

There is a large data and knowledge deficit on this issue of cookstove adoption. Significant research is required in order to strengthen evidence-based action/policy if progress is going to be made in changing the trends. The role that different actors could play for enhancing ICS dissemination and the market potential for clean cooking fuels and technologies is not well understood. While the markets are naturally segmented according to income, there are many distortions in both traditional and modern fuels (Foell et al, 2011).

Recommendations and conclusions

While there is a high potential for ICS to become an attractive opportunity and has the potential to improve health outcomes and livelihood opportunities for millions of households, energy access programmes will only be successful so long as the individual households accrue perceived and real benefits. Social barriers must be addressed, as most of the ICS programmes seem to work on the technical design aspects of improving efficiency of ICS (both mud based and turbo stoves). Customised designs of ICS have to be developed for different regions and countries, both for fixed and portable stoves, such that they can use different types of biomass fuels and are easier to operate (for example, using the same stove for heating and smoking in cold regions). It might also be worthwhile to understand the users' positive perceptions of the features of traditional stoves and attempt incorporating such features in the ICS to ensure their wider acceptability.

It will also be useful to adopt an integrated approach – an effective kitchen design with proper ventilation along with introduction of high efficiency stoves. This could be a less invasive intervention to improve indoor air quality in rural kitchens, which is also critical. Further, it is important that cookstove design takes into account compatibility with a wider variety of utensils, given diversity of foods, and also different types of flames for easier adoption of the stoves.

A key challenge, both in South Asia and Sub-Saharan Africa, will be to ensure that the cookstove is affordable enough for the end-consumer. Novel retail and financing mechanisms including bundling using the joint liability group route should be explored to enable smaller payments over a specified period of time. Instead of conventional product sale modalities, a concept sales approach might yield better results. Thus innovative and focused marketing models, for reaching out to the rural population, coupled with a better supply chain of entrepreneurs and capacity development of youths and village women to build and service ICS, is required for wider dissemination. Adequate awareness and marketing efforts are also required, targeting both genders in communicating the monetary benefits of ICS and avoiding fuel and health expenditure.

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* Full list of references
* Authors' profiles
* Acknowledgements

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Viewpoints

Interview with Kirk Smith, Professor of Global Environmental Health, University of California, Berkeley

On 1 May 2014, the UK Department for International Development (DFID), the World Health Organisation (WHO) and the Global Alliance for Clean Cookstoves (the Alliance), co-convened a conference on Clean Cooking at the Royal Society in London. The conference brought together the latest research and evidence on a range of sector-relevant issues and topics, and sought to raise awareness, stimulate debate and act as springboard for further collective and effective action.

Topics and questions of the conference included: The scale of the public health, environment and livelihoods issues posed by cooking on solid fuel; how low household air pollution (HAP) levels need to be to avoid damage to health – particularly for women and children; what cooking practices, stove and/or fuel combinations can reliably achieve the desired health, social and environmental outcomes; and options and interventions which could contribute to the sustained adoption of cleaner cooking practices.

Alongside presentations by international practitioners from civil society, the private sector and donor and multilateral agencies, the event also included a High-level Segment, with speeches from DFID Minister Lynne Featherstone, Radha Muthia, Executive Director of the Alliance and Dr Maria Neira Director, Public Health, Environment and Social Determinants of Health, WHO. This segment highlighted the need to work together to address the extent and impact of cooking on solid fuels - currently estimated by the WHO to be responsible for 4.3 million deaths per year. The event was attended by over 100 participants from the UK, Europe and North America, representing health, energy, gender, climate and development professionals, businesses, decision-makers, NGOs, investors and academics. An event summary and access to all the presentations made at the meeting are available on-line from DFID.

Mike Clifford from the University of Nottingham interviews Kirk Smith on his presentation and overall thoughts of the Conference.

Picture 1: Kirk Smith, Professor of Global Environmental Health and HEDON Patron

Introduction written by Gemma May, DFID

Mike: I was surprised to learn at the conference that HAP is responsible for as many deaths in men as in women, despite women receiving a higher dose of HAP. Can you explain this?

Kirk: The risk (percent increase in disease) is higher for women because they receive higher exposures to HAP, but the burden (absolute impact) is a bit higher in men because they have greater background rates for the diseases caused by HAP.

Mike: In your presentation you mentioned that even the cleanest biomass burning stove couldn't meet WHO's PM2.5 target for HAP and even with a "clean" stove, HAP is likely to be too high if your neighbour is still using a traditional stove. It seems that the only way to reach the WHO's targets is for whole communities / villages to change their cooking habits collectively. Do you think that this is likely?

Kirk: Little has been done in recent years to learn how to move whole communities toward cleaner combustion at once, but the largest stove programme in history, by far, the National Improved Stove Programme of China did just that. The counties were not paid for their work until an independent monitoring group verified that at least 85% of households had switched to the new stoves, which encouraged community engagement. By

modern standards, those stoves were not clean enough, but NISP stands as an example of a highly successful community-level intervention: ~180 million stoves.

Mike: From Nigel Bruce's presentation, it seems that for some health impacts, a moderate reduction in IAP appears to lower the risk of diseases. Zahra (IDS) and Joy (ENERGIA) mentioned that having a more efficient wood burning stove might mean that women and girls have to collect less firewood, which could have more direct benefits in terms of carrying less heavy loads and being in high-risk areas less often. Do you think that there is sufficient value in these benefits to encourage the adoption of efficient wood burning stoves for those who cannot afford to switch to cleaner fuels?

Kirk: Yes, increasing the efficiency of fuel use has many benefits and should be encouraged.[1]

Mike: There was mention of "dirty fuels" as distinct from "dirty stoves". Coal and Kerosene seem to fit into these categories, but there seems to be some debate around biomass. For instance, GIZ have a publication with the title 'Wood Energy: renewable, profitable and modern'. Do you see a long-term future for wood as a fuel?

Kirk: This is a difficult question that depends on how one defines "long term" and where the fuel is used – in an isolated cabin in the forest or in a densely populated village or town -- among other issues. Unprocessed solid fuels can be used in a clean manner, but it is extremely difficult to do so in simple inexpensive small-scale devices. Assuming "long term" means in a way that is health protective, it seems most likely that processed fuels made from biomass (e.g., pellets) will need to be used at the household level to be reliably clean enough. On the other hand, there are places in both rich and poor countries where for different reasons wood will remain important for many decades. Space heating and fireplaces are the issue in rich countries, however, and more and more rich countries are realising that wood smoke is a health threat.

Mike: In locations where the collection and use of wood is the only fuel source a community is used to, do you see benefits in promoting improved wood burning stoves simply because they use less fuelwood?

Kirk: Certainly, but then any health claims should be modest unless HAP exposures also are shown to decrease.

Mike: Governments seem to be keen to have stoves tested and certified as "clean" with agreed global standards. What are your views on this? Do you think this might disadvantage smaller local / indigenous stove producers, given the high costs of testing cookstoves?

Kirk: Absolutely critical to progress. Any group, large or small, should be discouraged from promoting something that has not shown to produce results in independent testing, preferably in the field as well as the lab. On the other hand, help should be offered to smaller groups to have this work done.[2]

Mike: There was a striking amount of business-speak in some presentations, with phrases such as: "investment-ready", "how to be impactful in the sector", "broker partnerships", "top line goal", "demand generation", and "enterprise capacity building fund". Does this type of business jargon really only appeal to those in urban communities who have the capacity and experience to scale up energy efforts? Does this neglect the rural poor and widen the divide between private sector 'market approach' and NGO 'humanitarian approach'?

Kirk: One of the problems I see is the narrowness of the definition of the 'market approach'. It is interpreted as meaning "sales directly to households" There is another approach to consider, however. In the health sector, for example, we do not sell vaccines house to house or have NGOs develop them, but still rely on the market system and NGOs. The best vaccines/antibiotics/etc in the world are developed by the private sector under strict quality control by governments/international agencies and then the price is beaten down through various procurement processes (pre-purchase, royalty forgiveness, etc) Then, these are made available to local communities by NGOs and others. NGOs' main role is where their strength lies, i.e., community involvement, and not where the strength of others is greater, i.e. technology development. Reframing HAP as a health issue would change the way solutions are designed. We may want to consider doing so.

Mike: It is clear that as with many technologies, results in the lab are often not replicated in the field. Is there a way to address these concerns when certifying stoves?

Kirk: I hope so, but more effort is needed to think how to develop simpler ways to do so for solid fuel stoves. One advantage of clean fuels, of course, is that there is much less difference between lab and field performance –you cannot make a biogas stove dirty no matter what you do.

Mike: Bringing about behaviour change on a large scale is clearly essential if the WHO targets are to be met. What lessons do you think the stove community could learn from other sectors?

Kirk: Excellent question and we have only just started to seriously think what can be learnt from anti-tobacco and sanitation programmes for example, both of which have found ways to modify behaviour through shifting the social contexts of their risk factor. I do think the anti-HAP community can learn much by study and interaction with others.

[1] Examples include reduced time for collecting wood, reduced risks to women and children during collection, reduced pressure on local deforestation – *Editor*

[2] There are various ways this could be done – see the Helpline section in this issue for more information – *Editor*

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PEER REVIEWED

New Modern Energy Consumers: Challenges for efficient cooking fuels in the Greater Mekong Subregion

Keywords: Energy efficiency; Cambodia; Modern energy consumers; Cooking fuels; Greater Mekong Subregion

The MECON project is investigating the design and implementation of energy efficiency policies targeting New Modern Energy CONsumers (MECON) in the Greater Mekong Subregion. Drawing on the results of a household survey and market analysis, this article discusses the use of biomass cookstoves and other cooking appliances in Cambodia, Laos, Myanmar, Thailand and Vietnam. It highlights the experiences of one of these countries, Cambodia, to draw attention to the experiences and challenges of encouraging the uptake of improved biomass cookstoves.

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Picture 1: Traditional three stone stove (Source: San Vibol)

Introduction

Energy efficiency offers multiple benefits, including reduced household energy expenditure, enhanced energy security and improved productivity. For developing countries, energy efficiency is vital because it curbs demand growth, thereby reducing fossil fuel imports, lowering additional power capacity needs and facilitating cheaper, faster energy access to populations. Improved energy efficiency will also reduce energy consumption, leading to lower energy bills for consumers. Energy efficiency can make it easier for lower income households to pay energy bills, freeing up funds for other needs (Sarkar and Singh, 2010). The adoption of energy efficiency measures has technical challenges, and there remains important non-technical barriers, such as high upfront costs and energy illiteracy, particularly at the household level. As a result, many of the potential energy efficiency gains remain untapped.

MECON: Investigating energy efficiency in the Greater Mekong Subregion

The MECON project is one of the projects under the 'Understanding Sustainable Energy Solutions' (USES Network), a EPSRC-DECC-DFID funded programme. MECON is investigating the design and implementation of energy efficiency policies in the Greater Mekong Subregion (GMS: Cambodia, Laos, Myanmar, Thailand and Vietnam). In particular, it is focusing on the 'new Modern Energy CONsumers' (MECON), those who have access to electricity but who live on low daily incomes (US$ 2-5 per capita, purchasing power parity (2005)). Our analysis of World Bank data reveals that in 2008, between a third and a half of the populations of the GMS countries lived on US$ 2-5/ capita (PPP). The proportion of those classified as MECON has increased over the past 20 years due to improved access to electricity and increasing

MECON is a two year project, which began in June 2013 and will run until May 2015. MECON has six project partners: the Royal University of Agriculture (RUA, Cambodia), the National University of Laos (NUL, Lao PDR), the Myanmar Engineering Society (MES, Myanmar), the Joint Graduate School of Energy and Environment (JGSEE, Thailand) University College London (UCL, UK) and the Hanoi University of Science and Technology (HUST, Vietnam). The project is funded by the UK Research Councils' Energy Programme, the Department for International Development, and the Department for Energy and Climate Change, and managed by the Engineering and Physical Sciences Research Council.

The use of energy for cooking is just one aspect being investigated and MECON will also focus on lighting and electrical appliances. Future work will involve policy and cost-benefit analysis, as well as investigation of the institutional conditions within which energy efficiency policies will be designed. Further detail about MECON is available at http://meconproject.com

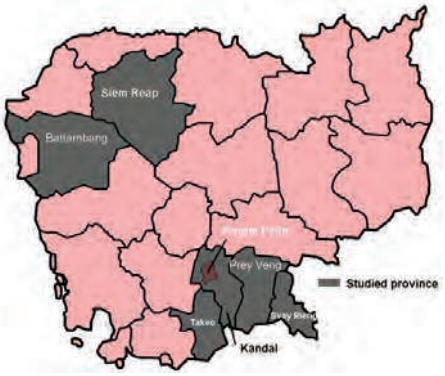

Figure 1: Study sites, Cambodia (MECON Project)

household incomes. In Cambodia, for example, the share of MECON has increased from 14% in 1994 to 40% in 2008. However, in other countries, particularly Thailand, continued economic growth and increasing household income are likely to lead to a reduction in the proportion of people who fit the definition of a MECON.

According to the OECD (2012), it will be these consumers, i.e. the emerging middle classes, who will be responsible for a large share of expected increase in energy demand and thus GHG emissions. Individuals and their energy choices influence patterns of energy consumption and therefore the supply-side options developed to meet them (Sovacool, 2014). Understanding how the MECON currently consume energy, and how these patterns may change in the future will be vital for informing and developing policies that promote energy efficiency. The project will assess the opportunities and barriers to energy efficiency by focusing on a range of energy services, including lighting, heating, cooling and use of electrical appliances, as well as fuels for cooking and transport. In this article, we draw on the results of a household survey to discuss the use of cooking technologies by the MECON in the GMS. The article then analyses one country, Cambodia, to highlight some of the challenges to the adoption of more energy efficient cooking technologies.

Use of cooking technologies by New Modern Energy Consumers in the GMS

A household survey was undertaken in order to establish an evidence base on energy use, and to identify the opportunities and barriers to the adoption of energy efficient technologies, measures and policies amongst the MECON in the five GMS countries. The survey was designed to gather information on the use of energy for cooking, lighting and electrical appliances. A total of 1660 questionnaires were carried out between January and May 2014 in both rural and urban areas. Surveys were undertaken in communities using numerous enumerators. It was important for surveys to be conducted face-to-face in order to encourage a higher response rate.

Initial analysis reveals some commonalities and differences amongst the MECON in the five GMS countries. The definition of a 'new Modern Energy CONsumer' is that households have access to electricity and, across the five countries, grid electricity is the most common form of electricity access. Only in Cambodia do decentralised, community grids account for a substantial percentage of households (26%). In addition to electricity, MECON households across the GMS utilise other fuel types, such as kerosene, liquid petroleum gas (LPG), charcoal and biomass. For cooking, most households use more than one cooking appliance, including biomass stoves, LPG stoves, electric stoves, rice cookers and microwaves. Kerosene stoves are not commonly used, with less than 1% of households stating they use kerosene for cooking.

With specific regard to the use of biomass for cooking, both traditional and improved biomass stoves are widely used by the MECON in both rural and urban areas. For example, in Myanmar traditional and improved biomass stoves are used by 22% and 21% of households respectively; traditional cookstoves are most widely used in urban areas. By comparison, in Lao PDR these figures are 58% and 51% respectively. Surprisingly, in Thailand, the most economically developed country of all the GMS, 58% of households surveyed use traditional biomass cookstoves, with no respondents reporting to have used an improved cookstove (ICS). In Vietnam, of the 36% of households that utilise biomass, just 20% use improved biomass cookstoves and many of these households continue to also use traditional stoves. The use of traditional biomass cookstoves is therefore still widespread in the GMS and not limited to the poorest households, their use remains important to the emerging middle classes. The use of electricity for cooking, whether for electric stoves, rice cookers and/ or microwaves, is also common amongst the MECON.

Multiple cooking preferences in Cambodia

Cambodia has one of the lowest electrification rates in South East Asia and just 34% of the population have access to electricity (World Development Indicators, 2014). Electricity access is concentrated in urban areas, while transmission lines from Thailand and Vietnam now provide some provinces with imported electricity. In order to investigate the MECON, the household survey deliberately focused on the capital city, Phnom Penh, and six provinces that import electricity from neighbouring Thailand and Vietnam (see Figure 2). A total of 484 households were surveyed; 36% were located in rural areas, and households had an average of five members. While all households surveyed had access to electricity, other sources of energy, including biomass, charcoal and LPG, were also important.

Fuelwood is the most common source of energy for the majority of the population of Cambodia. Fuelwood and charcoal are often referred to as traditional fuels, yet they remain the dominant source of energy for cooking and boiling water to drink. The 2008 Statistical Yearbook reported that fuelwood was the most commonly used as fuel for cooking purposes, and was used in 85% of Cambodian households (National Institute of Statistics, 2008). Earlier research by San et al. (2012a, 2012b) on the adoption of ICS in Cambodia revealed a number of barriers, including the affordability, availability and distribution of the appliance. An additional barrier was that people preferred to use the three stone stove for boiling water, because it could be resized in order to fit bigger pots (see Figure 2). The ability to resize the stove meant that most families raising pigs (an important source of income in rural areas) similarly preferred the three stone stove when preparing pig feed.

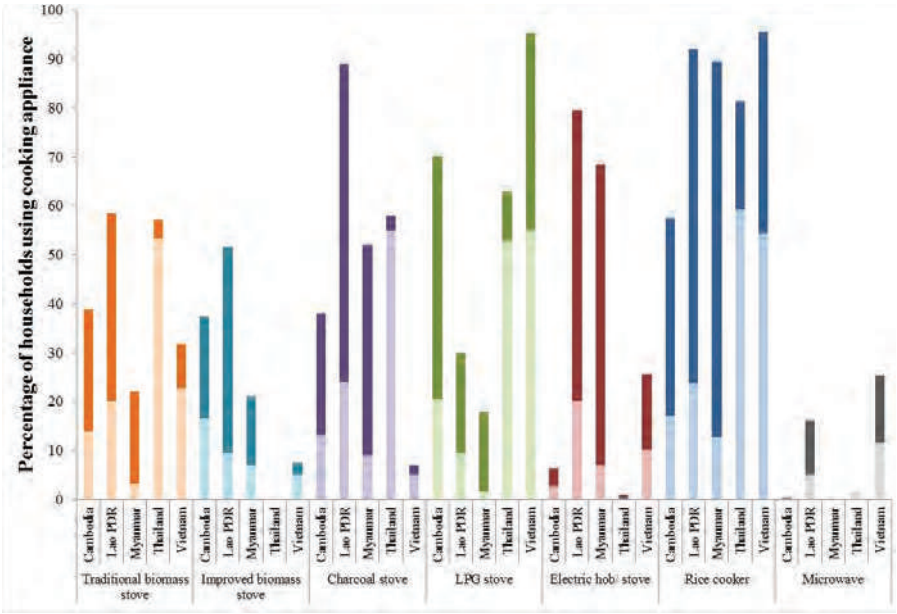

Figure 2: Use of cooking technologies amongst the MECON in the GMS. The darker shades show the percentage of urban households using each appliance, while the lighter colours show the percentage of rural households. Percentages do not add up to 100% because of fuel stacking

The survey revealed that, even with access to electricity, 69% of MECON households use biomass as a cooking fuel. Of these, the majority (77%) also use one or more other type of cooking fuel, such as LPG and/ or electricity; a minority continue to use only biomass or charcoal for cooking. There is no significant difference between households in rural and urban areas. Of the households that use biomass, 39% use a traditional biomass stove, as well as non-biomass fuels, but do not use an ICS. Those households that did not use biomass (31%) use one or more other fuel types for cooking, including LPG and electricity.

The use of multiple cooking fuels, or fuel stacking, is therefore a common practice amongst those we surveyed. It is recognised by scholars and practitioners that the transition away from so-called 'traditional' to more 'modern' appliances is not linear, and this research provides further evidence to support this argument. In other words, as incomes increase, households do not stop using traditional fuels and cooking methods, but rather continue to use a combination of fuels and appliances. There may be a number of reasons for this including, cooking behaviours, cultural preferences, and the availability, dependability and affordability of fuels and appliances. Indeed, many of the barriers to the uptake of ICS in rural areas of Cambodia, as revealed by San (2012a, 2012b), are likely to apply to the MECON and to the adoption of other more efficient cooking technologies. Understanding how energy demand, behaviours and aspirations change with increasing household income and wellbeing is critical if appropriate policies to promote energy efficiency are to be designed.

Conclusions

In the GMS, continued economic growth and improved social wellbeing will lead to changing consumption patterns and energy demand. The MECON project focuses on the emerging middle classes – the new Modern Energy CONsumers – who are expected to drive many of these changes. The initial results presented in this article provide evidence for a shift in consumption patterns amongst the MECON away from traditional biomass and towards more energy efficient cooking fuels. However, it also suggests this transition is not linear, with households consuming multiple fuels, known as 'fuel stacking'. Many of the barriers relevant to the adoption of ICS amongst rural populations also apply to the uptake of more efficient fuels and appliances by the MECON, particularly cooking and consumption habits, affordability, availability and dependability, and cultural factors. As the percentage of those living on US$ 2-5 increases in the GMS, it will be important to consider current and future energy needs, consumption habits and behaviours. While many challenges will be specific to particular contexts, there are likely to be commonalities across the five GMS countries. This provides opportunities to learn from others and to develop appropriate policies that target the needs of this increasingly important demographic.

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PEER REVIEWED

A participative approach: A rural community develops, tests and adopts an improved cooking stove in India

Keywords: Improved cookstoves; India; Participatory methods; Comparative study; Wood consumption

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Picture 1: A diffusion meeting where women of the project's two villages in AP present their experiences to another village, proposing they join the project (Source: forMed)

Two villages of the Banjara tribal community, in rural Andhra Pradesh, India, have joined efforts to embark on a project of experimental learning and action-oriented research, supported and technically assisted by forMed. A prototype of a stove has been developed locally and tested in all 60 households of the two villages, where families had not left for temporary migration, demonstrating a reduction in consumption of wood of 40% against the traditional three-stone fire. This step has been instrumental to determine true and widespread ownership of the concept of cleaner cooking. Fifteen villages have now joined the programme and aim at the self-production of ICS.This project illustrates a successful uptake of ICS when the barriers of low community participation is addressed from the outset.

Introduction

The Indian improved cookstove (ICS) programme (Sinha, 2002) has distributed over 32 million stoves between 1983 and 2002, of which 60% are still in use, according to a survey undertaken in 1995-1996 (Natarajan, 1999). This number has likely substantially declined given the discontinuation of the programme and certain unpredictable barriers, including the overestimated lifetime of the stoves (Kishore, 2002). Indeed, few of the stoves lasted more than two years (Desai et al, 2004) and only 5% of rural households have an ICS.

Although the programme has been considered successful in Andhra Pradesh, (Barnes et al, 2012), barriers such as the low quality of the stoves and no after-sales support have severely hindered the programme. Recognising that there are almost 160 million households that still rely on traditional stoves in India (Dalberg, 2014), a new National Biomass Cookstove Initiative for India (Venkataraman et al, 2010; Prasad, 2014) advocates an approach that is more sensitive to local dietary and cooking habits, a stronger role of private entrepreneurs, and financing mechanisms beyond grant and subsidy based approaches.

For several reasons, people who have traditionally cooked on open fires are reluctant to accept a new solution. Often, and especially when donated or subsidised, ICS are not 'owned' by the recipients and therefore the design is not developed to meet their needs, the advantages over the open fire are not valued, and maintenance schemes are usually not available. These challenges, or barriers of adoption, have resulted in abandonment of the stove after a few years, nullifying any effect on health or the environment (Hanna et al, 2014) .

In this report we describe an attempt to implement a community based approach to encourage competent adoption of ICS.

Materials and methods

Setting and history

The project was implemented in rural Andhra Pradesh (AP), Medak District, about 60 kilometres outside Hyderabad. In 2010 and 2011 the authors visited two villages of the Banjara tribal minority, Jaji Thanda and Nagonikunta Thanda. The interest of this community to develop a fuel-saving and safer way of cooking emerged during these visits where issues linked to social cohesion and community participation, health and environment were discussed. In 2011 it was decided to build, with the help of a local artisan, a prototype of a fuel-efficient low-emission stove according to various design specifications

	Total quantity (Kg, for water Kg 1 = lt. 1)							
	Rice	Roti flour	Mixed vegs	Water for cooking	Total food	Water for bath	Total wood	% reduction in wood
Stove	144	45	82	528	796	2984	262	40.5
Open fire	164	47	90	557	858	2770	441	-

Table 1: Total amounts of food cooked, of water brought to lukewarm temperature (for bath) and of wood used with the stove and with the three-stone fire in the comparative experiment (60 households used each cooking method for a full day)

	Water, litres	Food, kg	
		≤12	>12
Stove	≤55	3.2 (22)	6.2 (9)
	>55	3.4 (9)	5.3 (20)
Open fire	≤55	4.6 (25)	10.8 (12)
	>55	5.1 (5)	9.6 (18)

Table 2: Observed average consumption of wood according to amount of food cooked and of water brought to lukewarm temperature (using the median of the respective distributions, namely Kg 12 and lt. 55, as cut-off value). Number of observations in brackets

available in the public domain (Bryden et al, 2005; Still and Kness, 1996), adapting them to local skills and materials. It was essentially a replica of the original Winiarsky simplest design of the 'rocket stove' (Baldwin, 1987).

A metal model was made by a local workshop and demonstrated in the square of Jaji Thanda, where villagers eagerly fed wood in the rocket stove, not believing that smaller quantities were sufficient and would burn better. The performance of the prototype stove was judged interesting, particularly concerning the visibly reduced emission of smoke.

The stove used for the comparative test

During the winter of 2011-12, another model was developed which was shorter (37.5 cm high) and with a smaller footprint (base fitting in a square of side of 35cm). The local women had requested this change because they did not want to relinquish their tradition of cooking in a squatting position. It was fitted with an adjustable metal skirt to be wrapped around the pots of unpredictable sizes, shapes and materials. The combustion chamber was insulated with rice husk ash, collected at a local kiln as a by product of the firing of bricks. The section of the combustion chamber was of 130 cm2. Two such stoves were made of zinc-coated sheet metal. The villages were interested to test them and it was agreed that a scientific study should be undertaken.

Experiment design

A survey conducted by the Centre for People's Forestry, Hyderabad, in 2009 in six villages of the area, totalling 1379 households, had shown that the average daily consumption was invariably between 6-7 kilograms. Even assuming a standard deviation of daily wood consumption of between 1-2 kilograms, and in order to demonstrate a reduction in wood requirement of at least 1 kilogram (roughly 15% of the current consumption), a paired t-test with 90% power and two-sided significance level set at 5% would have required a minimum of 44 households (Machin and Campbell, 1987) each contributing one observation with the stove and one with the open fire. However, all 71 households of the two villages expressed the desire to take part in the experiment.

Since only two stoves were available, only one family on any given test day could use it in each village, while another family would use the traditional open fire. A random assignment list had been drawn to specify which of the two methods was to be used first by each household. A typical menu was agreed upon to be cooked on the test days; rice, rotis (flat corn bread) and vegetable curry. No other cooking would have been done on the day of the test and only water for bathing would be heated bringing it to a lukewarm temperature. The night before the test, the study assistants weighed more than enough of all food items and of water for cooking and put each in a separate plastic bucket. Water was also measured and stored in a bigger container. An abundant quantity of wood was weighed and set aside. In the evening of the test day, the left over quantities of food items, water and wood were weighed in order to establish the amounts used. Oil, salt and spices were ignored as well as any residual charcoal (generally minimal because Banjaras are excellent at tending fire).

Two questionnaires were administered, interviewing the cooks. The first, developed using well established tools (Rehfuess and Lambach, 2008; CRECER, 2004; Dasgupta et al, 2014; WHO, 2004), covered household characteristics including: type of dwelling, type of kitchen, energy sources, time spent cooking, and health of cook and family members. The second, administered at the end of the test, covered satisfaction with the stove.

The effect of the stove on wood consumption was modelled using generalised least squares random effect regression as implemented in STATA Statistical Software. Wood was expressed as the function of the cooking method (stove or open fire), total amount of food cooked, total amount of water brought to lukewarm temperature and first order interaction terms of the latter two factors with the cooking method. Households were modelled as random effects. The model explained 65% of the total variance.

Results

The study took place in December 2011 and January 2012. Of the total 71 families, 62 took part in the survey and of these 60 in the comparative test, 32 in Jaji Thanda and 28 in Nagonikunta Thanda. The household size ranged from 2-11; 111 children (31% of the total population) were aged 14 or less.

Forty-four families (71%) cook exclusively with wood, and the remaining households also use agricultural residues or dried cow dung. Only one household occasionally uses LPG and another electricity in addition to wood. Fire is made on the ground, with the typical three-stone arrangement, in almost half of the cases surrounded by bricks and dried mud to allow for two pots (each on its own fire). Cooking occurs either outside or in the house or in a separate hut, depending on the season, and only three households have some sort of hood to force out the smoke. Only eight households cook exclusively outside. Twenty-nine families have children aged five years or less, and in 12 of them the children are always with the cook (generally the mother) while she uses the fire. The women interviewed consider their health excellent to good in 41 cases and fair to very poor in 21 cases.

The crude estimation of wood consumption during the comparative test showed a reduction of 40.5% in favour of the stove (see Tables 1 and 2). Estimates of consumption allowing for the variability among households and between the test days in amounts of food cooked and of water heated confirm the advantage of the stove (test results available @HEDON). The results of the test were discussed at a large meeting with representatives of each household of both villages. Representatives from several neighbouring Banjara villages also attended, having heard about this work and wishing to be included in future plans.

Box 1: Experience of women with collection of wood and the exposure to open fire smoke. More questions and answers available @HEDON

In your household, who gathers the fuel wood?

Only purchased — 2
Only the women of the household — 3
Both men and women of the household — 57

How much time do you spend daily tending the open fire?

Not more than 1.5 hours — 11
Between 2 and 4 hours — 49
More than 4 hours — 2

Does smoke from the fire make you cough or irritate your throat?

Never or sometimes — 23 Often or always — 39

Given the interest in the stove, it was decided that a stove model made with material that was cheaper than sheet metal but still utilised the villagers' skills (this community in particular makes its own bricks for building purposes) had to be developed and used as leverage to push forward a more ambitious plan. Discussions were held in the villages, facilitated by the research assistants and with technical and financial input provided by forMed, to develop a vision for a near future that would include:

- research and development on fuel-efficient low-emission stoves aiming at self-production
- sale, installation and maintenance of the stoves within a growing network of Banjara villages
- further community-based action-research initiatives on topics like water availability, sanitation and forest management
- application for government funds for the direct implementation of programmes in health promotion and environmental protection
- the certification of carbon credits through reduced use of wood and better management of the forest

The last two initiatives would contribute to the establishment of a common fund for village improvements and for micro-financing needs of individual households.

With such motivations, the work of the villages has thus seen several achievements so far: the establishment of a technical team, which has developed a fire resistant insulating ceramic that can be used to realise several models of improved stoves at very low and affordable cost; the establishment of two diffusion teams, primarily made up of women, that organise meetings in other Banjara villages to present the work done by the initial two villages and the vision for the future; the consolidation of a growing network of interested Banjara villages, amounting to 15 at the end of 2013, an estimated 4500 individuals; and the decision to install at least one ICS produced by the network in each household of the network.

Discussion

Although the 'rocket stove' has been around for three decades (Baldwin, 1987), its dissemination has been very slow. The most recent data, suggests that the two biggest commercial ventures in India have together sold only 600,000 such units (Shrimali, 2011). Prof. Kirk Smith stated that "too much emphasis has gone on technology and talking to people at the top and too little on consulting the women who actually do the cooking. When subsidies run out the development schemes have faltered, the stoves are left unused or broken" (The Economist, 2011).

Although it is too early to evaluate the success of the programme in terms of use and impact of ICSs on the users' health and the environment, we have demonstrated that a comprehensive approach with a very high level of community participation can be achieved. In this approach, where the introduction of ICS is nested within a broader agenda, data has been collected and discussed with the community because this information belongs to them. Even if they may be illiterate, it is their symptoms, their wood consumption and their living conditions that form the basis of this programme. The data collected was impactful to the community in many ways. The potential positive impact of wood savings on the forest was highly appreciated, as the Banjaras also depend on the forest for medicinal and edible plants as well as for goat grazing. The questionnaire administered to each cook helped them understand the connection between symptoms and exposure to smoke while cooking. Furthermore, a pragmatic approach to cooking conditions such as the allowance for variabilility in cooking vessel sizes, shapes and materials addressed certain barriers that come from adhering to particular technological considerations and and not to the practices of the particular community.

The societal structure of the Banjara community played an unforeseen role in building interest in the programme. The village leaders have been pivotal in building consensus, acting as local promotors. Furthermore, the homogeneity of the caste within the Banjara community has facilitated a snowball effect, where word of mouth has shared the pros and cons of the programme from one village to another. Caste divisions may have been a barrier to this effective in-built social marketing strategy. In addition, self-production of ICS not only responds to the concern of ownership, but can also be seen as a solution to the otherwise hardly reachable poor and rural populations, often neglected by sales and maintenance cost reduction considerations of large commercial ventures.

Though time alone can demonstrate the efficacy of this programme, our intense interaction with the local community has already seeded, in all those involved, a deep sense of emancipation that can be extended to other community-based efforts within the established and hopefully growing network of villages.

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Viewpoints

Interview with Brady Luceno, Assistant Director of Project Gaia

Picture 1: Boys carry cane waste for burning along sugar cane fields in Metahara, Ethiopia

Project Gaia is a US based non-profit that promotes clean, safe, efficient cookstoves powered by alcohol fuels. Project Gaia works in Africa, South America, Central America and the Caribbean. Daniel Seals sits down with Brady Luceno, Assistant Director of Project Gaia, to discuss how she got started in this field and the challenges Project Gaia has faced in pursuing a clean cooking solution for communities around the world.

Daniel: When did you start working with Project Gaia?

Brady: I began working with Project Gaia in January 2009 after graduating from Gettysburg College. At that point Project Gaia was already five years into our work in Ethiopia, mainly in the Somali refugee camps, so we needed staff on the ground to work in the camps and strengthen our relationship with the Ethiopian government.

Daniel: Why did you decide to enter the clean cooking sector?

Brady: As a globalisation studies major, I was able to not only study numerous issues that affect communities and citizens around the world, but travel to areas where I experienced firsthand the energy challenges our generation must tackle. The issue of cooking is an issue I feel everyone can relate to and it cuts across all sectors from pubic health and the environment to women's empowerment and livelihoods.

Daniel: Tell me more about your work in the refugee camps.

Brady: The projects in the refugee camps really transitioned Project Gaia from a policy and research entity to an implementing organisation. Ethiopia, like many sugar producing countries, produces sugar from sugarcane, but was dumping its waste molasses, a byproduct. In 2003, the government decided to act and saw the opportunity to turn waste molasses into fuel for cooking with our help. We were already working with a stove, the Dometic CleanCook that fit the Somali cooking culture very well. Within two years, we were able to reach nearly 100% coverage in two of the largest Somali refugee camps in Ethiopia.

Daniel: Were the challenges you experienced in the first few years at Project Gaia the challenges you were expecting to encounter?

Brady: My first experiences were mostly focused on research and information gathering on fuel prices and cooking habits in relation to the CleanCook stove. I thought my initial job would be to find a way to get more stoves to families. It wasn't until I was able to talk openly with women in their kitchens, on my first trip to Ethiopia, that I realised fuel supply was the key issue.

Daniel: What shifted your focus to the fuel supply?

Brady: We had been in collaboration with the Ethiopian Government to supply the camps with ethanol fuel for cooking for the last five years. On my very first trip to speak with women in their homes, I realised that the government was in the process of halting the supply to the camps due to ethanol blending opportunities for the transportation sector. I was hearing all of this positive feedback about the stove and how the women's lives had improved, but harboring the knowledge that the fuel supply would be interrupted for these families very soon. It was a frustrating and enlightening moment for me in the project.

Picture 2: Women and children in Somali Regional State, Ethiopia, with the CleanCook stove

We began to realise that we couldn't just be a stove organisation, but we had to be a fuel organisation first and foremost.

We needed to look at innovative ways for communities to have sustainable access to fuel. We strengthened our relationships with global ethanol producers as well as investigated small-scale production units. In order for our stove projects to be successful, ethanol had to be available at the household level, as affordable and reliable as traditional fuels. We began to see that the local production was a great option for countries and communities to have a renewable and modern fuel while also adding great social and economic value. So, in Ethiopia we began building micodistillery units, owned and operated within communities.

Daniel: Would you say fuel is the only barrier to widespread stove use? What about stove compatibility?

Brady: Fuel is the first barrier. The second barrier is the supply chain for fuel. The third is financing an affordable, modern, and durable stove for the end-user. If you have those three things in place you will have a successful programme. We work with educated consumers who deserve and recognise quality goods. The stove has never been the issue for us. It is efficient, safe, long lasting and cooks quickly. It is always popular. What families are concerned with is access to a fuel that is reliably available, affordable, safe and modern.

People want modern stoves, and by modern stoves we really mean modern fuels. A modern fuel is clean and accessible and brings value to people's lives.

Daniel: What value do modern fuels bring to families?

Brady: Besides the health and environmental benefits, time savings is a huge and underestimated benefit when we talk about value. Women, children and men get back time, time that would normally be spent collecting fuel, tending solid fuel fires and preparing meals. When we think of socioeconomic development at the community and country level, we must promote products that make people's lives easier.

Daniel: Where have you been working with ethanol producers to address the fuel supply issue?

Brady: Haiti used to be a major ethanol producer. Due to cheap sugar imports, the local market bottomed out in the 1990s. We pursued major ethanol producers (outside of Haiti) to help jumpstart a market in Haiti with the end goal being to revive the sugarcane market for both food and fuel. We think major producers can play a key role in the supply chain and provide needed support, expertise and quality fuel. We are also working with experts on ethanol fuel policy around the globe.

Daniel: So is the goal local production of fuel?

Brady: Yes. For us and the existing ethanol industry that must be the goal. Ethanol can easily be made out of by-products often side-by-side with food production. Wherever we can reduce the cost of bringing fuel to the end user we are going to pursue it. In ethanol, we have a chance to create markets, jobs, and provide an alternative fuel that is truly renewable.

Daniel: What challenges does Project Gaia face once the fuel is available?

Brady: The supply chain is the linchpin for us: finding a way that is convenient and reliable for families to access fuel. Each country has its own supply network, its own way of doing business. The trick for us is to incorporate ethanol into that system. In Ethiopia, Haiti or many of the other countries where we work, poor people pay the most for energy since they are often purchasing fuel daily. This is reflected in the prices of the small bags of charcoal which cost much more than the larger sacks. On a day by day basis, LPG is actually more affordable than charcoal in some of these markets, like Haiti, but people cannot afford the bulk purchase of the cylinder. Our goal is to try and mimic supply chains that reach the base of the pyramid, like charcoal. We can achieve this by selling ethanol by the half litre, or in five litre containers. One litre can typically last one or two days for a family of five. The challenge for us is to actually implement these distribution chains, since the market for alcohol fuel is new.

In some countries where we work, alcohol fuel is only classified as a beverage, and therefore receives the same high taxes as drinking alcohol. For example, Kenya is a major ethanol producer but until recently you could not purchase ethanol for stove fuel. Beverage alcohol receives a 120% tax. The ethanol we use in stoves is denatured with a bittering agent and dyed, which renders the fuel undrinkable. In all the countries where we work, we try to influence policymakers to recognise alcohol as a cooking fuel. For the most part, we believe ethanol is afforable in local markets and does not need to be subsidised, however we do need to make sure that alcohol fuel for cooking is not taxed differently than perhaps kerosene or LPG (which are still subsidised in many countries).

Daniel: Beyond your work with ethanol, what barriers have you seen to clean cooking solutions?

Brady: Each project and organisation inherently has its unique issues to overcome. But that is why we must continue to work, share, think and evolve together. On a global scale, I think our reliance on wood has escalated far greater than we are willing to admit. The forests are disappearing out from under us. I couldn't feel more strongly that the time is now to focus on creating systems that encourage the use of truly renewable sources of energy. We've received criticism that our fuels approach is a 'long term' and not a 'low hanging fruit' solution for consumers. I disagree. These solutions are ready now and they have the opportunity to offer some of the greatest long term benefits. Think how much more quickly this could happen if more of us broadened our focus from the cookstove to the fuel.

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PEER REVIEWED

Overcoming barriers to clean cookstove and fuel adoption: Why and how women must be integrated throughout the value chain

Keywords: Empowerment; Gender; Value chain; Women; Adoption; Cookstoves; Fuel; Entrepreneurship

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Picture 1: Woman cooking over open fire (Source: Alex Kamweru, UN Foundation)

Women are critical players in the adoption and scale of clean cooking solutions. Barriers to adoption of cleaner cooking solutions start within the home and with the cooks. Without engaging the women who are responsible for cooking in the design and dissemination of clean cookstoves and fuels, efforts will fall flat. As partners, women should be encouraged to lead efforts that seek to develop effective, culturally-appropriate, and sustainable solutions. Gender-informed business models in particular serve as a crucial foundation to the success of clean cooking solutions globally. In addition, best practices that engage both women and men need to be culturally adapted and widely applied throughout the sector. The Global Alliance for Clean Cookstoves' 'Resource Guide on Scaling Adoption of Clean Cooking Solutions through Women's Empowerment' outlines best practices for engaging women and addressing gender issues within the entire clean cooking value chain and is an important tool for understanding why and how to involve and empower women in the clean cooking value chain.

Introduction

Reliance on inefficient and polluting cookstoves and fuels disproportionately impacts women and girls because cooking and securing household energy remains a woman's responsibility in most countries. In order to cook for their families and secure the energy needs of their households, women must work long, arduous hours, which in many cases puts their health and safety at risk. Without access to cleaner cooking solutions, women are exposed to deadly smoke that kills over four million people every year (WHO 2014), and are forced to walk up to five hours per day to search for fuel and carry heavy loads of firewood for miles (Dutta, 2005; United Nations, 2010).

Not only is fuel collection time consuming and laborious, in conflict settings, women face an increased vulnerability to physical and sexual violence when leaving the safety of their communities or refugee camps to find fuelwood (Patrick, 2007; WRC, 2011). The time spent collecting fuel and cooking food can take hours, a reduction of which can allow women to complete other responsibilities and pursue income-generating opportunities, education, or even rest if they choose.

Although women are disproportionately impacted by inefficient cooking practices, they play a crucial role in the adoption and use of clean cooking solutions. In fact, a 2012 IFC report found that the

market for household energy devices and systems is estimated to be US$ 31 billion, with the potential to expand due to rising income, a decrease in technology costs, and public-private partnerships. In spite of these promising developments, key barriers must be addressed in order to unleash these markets, which include increasing consumer awareness, designing effective business models, and increasing willingness to pay. Women in particular are uniquely positioned to contribute to these solutions. As a result, women must be fully integrated into the process of designing products and approaches; without their input and feedback, products will fail to meet their needs and adoption will be limited (Cecelski, 2000; Clancy and Skutsch, 2002). As consumers and users, women not only drive demand, they ultimately decide if products are fully adopted. As entrepreneurs and market actors, women can catalyse markets and scale adoption by generating demand, reaching new and different consumer segments, and scaling distribution. However, in order to successfully engage women and address gender issues, several barriers must be addressed and enterprises must actively work to implement effective approaches and proven best practices.

This article demonstrates the critical roles women play in ensuring adoption of clean cooking solutions around the world. Based on literature review, applied research, and case studies, it provides a framework on how and why to include women in each section of the clean cooking value chain and outlines best practices for engaging women and addressing gender issues to scale adoption. This framework is the foundation of the Global Alliance for Clean Cookstoves' (Alliance) gender strategy to strengthen women's empowerment impacts, which can lead to the scale of adoption of clean cooking solutions and strengthen the global market.

Women are critical to scaling adoption of clean cooking solutions

Increasing the role of women and addressing gender issues is critical for achieving wide-scale adoption of clean cooking technologies. Research shows that energy access solutions must be designed with a gender lens in order to effectively consider and leverage the different societal and domestic roles of men and women (Cecelski, 2000; Clancy and Skutsch, 2002; Dutta, 2005). Cooking solutions designed with the end user are more likely to be adopted (Cecelski, 2000; Dutta, 2005). Cookstoves go unused and business models fail when they do not meet the needs of female users, require too much time and effort, and/or restrict women's involvement due to time or physical constraints. Enterprises that have overcome these issues utilise gender-informed business models and involve women from the beginning – from product design to after-sales service (Clancy and Skutsch, 2002). In most developing countries, women are the central managers of household energy and natural resource management, responsible for farming, animal husbandry, water and fuel collection, as well as land and forest management (Earth Summit, 1997; Lambrou and Piana, 2006; UNIDA, 2013). The gendered division of labour begins in childhood, ensuring that women become experts from a young age in the sustainable management of natural resources and household energy (Batliwala and Reddy 2003). Therefore, gender-informed business models can reveal insights and opportunities to fully utilise women's expertise and leadership, while also ensuring that men are supportive and comfortable with the products and approaches being promoted.

Women are also community and environmental leaders who can raise awareness about the importance of adopting more sustainable forms of energy. Evidence shows that poor urban and rural women are effective managers and entrepreneurs in a variety of contexts (Batliwala and Reddy, 2003). They have the local knowledge needed to design and deploy new alternatives and protect local ecosystems. When presented with appropriate opportunities, women can have livelihoods in the energy sector and unlock barriers to adoption. Due to their unique roles and responsibilities, women can make excellent cooking energy entrepreneurs. Fully utilising women's expertise and entrepreneurial spirit can release untapped potential and lead to new approaches to increase access to these technologies.

Women entrepreneurs increase adoption

Women are the fastest growing cohort of entrepreneurs and business owners in many developing countries (Ernst and Young, 2012). In fact, women living in developing countries are more likely than those in developed countries to start or run businesses (Brush et al, 2011). Women entrepreneurs have tremendous potential to spur market growth; however, they often lack sufficient support or knowledge. Approximately 860 million women globally lack sufficient education and access to finance to start businesses; this number is expected to rise to 1 billion in the next decade (Corporate Citizenship, 2010). When women are properly supported, their involvement as market actors can increase access to consumers and increase sales (Coleman et al, 2010). Strengthening women's economic empowerment opportunities not only increases adoption and sales, it can have other positive and important impacts. Studies show that women reinvest 90% of their income into their families and communities, while men reinvest 30-40% (Borges, 2007). Ultimately, the implications for economically empowering women can reach far beyond the individual.

Women have also demonstrated that they can be better investors and planners than men; an important criteria for success for energy entrepreneurs (Batliwala and Reddy, 2003; Dutta, 2005). Large implementers, such as Grameen Shakti in Bangladesh, have found that female clients have excellent repayment records and seek out borrowing to generate income (Batliwala and Reddy, 2003). Additionally, because women are often organised in large, expansive networks, they can scale distribution through existing chains and reach new segments of

Picture 2: Ghana marketplace (Source: Global Alliance for Clean Cookstoves)

the market. Network members are often trusted community leaders, which can generate demand, instill brand loyalty, and promote purchase and use of products. For example, Vodafone's Al Johar Initiative engaged women's networks to access female markets in Qatar in the hopes of overcoming cultural restrictions around movement and communication with men; the women reached 100 % of their sales targets (Corporate Citizenship, 2012).

Women's involvement can spur wide-scale delivery of quality after-sales services that contribute to the expansion of sustainably adopted, well-functioning products. Women can leverage their existing networks to promote the adoption of these new technologies and use their direct experiences to more effectively promote solutions. Using their understanding of and personal experiences with these technologies, they can develop appropriate and sustainable solutions that consumers want to use and can discuss the products in ways that instill trust amongst users. Increasing women's participation in the clean cooking value chain can lead to the creation of sustainable business models that leverage the capacity of local skills and knowledge and develop crucial, lasting partnerships with influential community organisations.

Solar Sister is tapping into the skills, knowledge, and networks of women to distribute solar energy products and clean cookstoves. They currently have over 400 female sales agents in Sub-Saharan Africa who serve to build and extend a supply chain for household clean energy products. Likewise, Sakhi Unique Rural Enterprise (SURE) in India engages rural women in the supply chain to distribute clean energy products to last mile consumers and to provide after-sales service. SURE works with over 400 women entrepreneurs who have sold over 86,000 cookstoves in the past four years.

As women seek to engage in the clean cooking sector, there are several common barriers that can slow their progress. The Alliance's resource guide identified the following constraints specifically applicable to women:

— Exclusion because of gender discrimination
— Limited education and/or technical and business knowledge
— Undervalued and undercompensated labour
— Lack of control over assets and resources
— Limited free time because of their triple role in society (reproductive, productive, and community responsibilities)
— Low representation in policy and decision-making

Therefore, it is critical that clean cooking enterprises actively work to overcome these barriers in order to realise the full benefits of engaging women. By conducting gender analysis, enterprises will better understand the gender dynamics in the communities they serve. This information will help enterprises understand barriers in recruitment and retention of women entrepreneurs, allowing them to develop strategies to overcome them. The Alliance's resource guide further identifies the common constraints that women entrepreneurs face including lack of access to financing, education, training, and market data, as well as mobility restrictions and discriminatory cultural norms.

In addition, fostering empowerment and leadership can be critical to more effectively engaging women as entrepreneurs. Despite their advantageous position to market clean cooking solutions, women entrepreneurs face specific challenges from both their extrinsic social and cultural environment, as well as intrinsic factors. While extrinsic factors directly influence an individual's capacity to function in their environment, multiple intrinsic factors – such as self-efficacy, agency, and motivation – contribute substantially to women's competitiveness, growth, and capacity to succeed as entrepreneurs. Confidence and self-efficacy in financial management directly influences success among women entrepreneurs (Amatucci and Crawley, 2010). Several Alliance-commissioned research studies have tested innovative training strategies for women entrepreneurs that focus on empowerment and leadership with positive results. A Johns Hopkins University study in Kenya demonstrated that the use of agency-based empowerment training significantly improved entrepreneurial capacity to sell cookstoves. Results show that not only are women nearly three times more likely to sell more products as compared with men, but those who underwent the empowerment training were 2.7 times more likely to be top sellers compared to those who participated in a standard entrepreneurial training.

Many sector actors are actively overcoming these barriers and tapping into the tremendous potential of women entrepreneurs throughout the value chain, including Eco-Fuel Africa, Solar Sister, GVEP International, Grameen Shakti, and Sakhi Unique Rural Enterprise. Each of these organisations are featured in the Alliance's resource guide as best practice case studies.

How to integrate women into each stage of the cookstove value chain

Women can be engaged in every section of the clean cooking value chain. To access a table of the best practices and tools to engage women in each value chain segment – design, production, distribution, after sales service, consumer finance and supplier finance - read this article online, available @HEDON.

Best universal practices to engage women

In order to increase the number of women engaged in market activities and to address gender issues that prevent the adoption of clean cooking solutions, there are several best practices that should be applied throughout the clean cooking value chain.

While there are positive implications for engaging women within initiatives, there can also be negative and unexpected effects. Realistic understanding of women's lives must be considered, particularly since empowerment projects can unintentionally result in additional work for an already oppressed and impoverished population. Households may come under particular strain from a shift in responsibilities as a result of gaining access to technology or

through women's engagement in activities (Clancy et al, 2012).

Projects that bypass men can also exacerbate negative consequences more easily, contributing to men's uncertainty and resentment about their new position (Clancy et al, 2012). Creating a strategy to engage men is therefore critical; it can help avoid these potential negative consequences. Roles and learnt behaviour of men and women vary across cultures, class, ethnicity, and income. Ultimately, it is important to understand cultural and social values and expectations; it is also critical to work with men throughout the process in order to limit any disruption to gender roles and the subsequent consequences for the women involved. There are several examples of energy programmes where men are engaged and supportive of women entrepreneurs. In Cambodia, GERES works with women entrepreneurs to produce cookstoves. In order to work with married women, their husbands need to endorse their participation in the programme. GERES communicates with the husbands beforehand to ensure they fully accept their wives' participation in the entrepreneurial activities.

In Uganda, Eco Fuel Africa uses a gender-informed strategic approach when working with women entrepreneurs. They invite both the women and their husbands to participate in business trainings, which has resulted in the men better understanding why it is important and beneficial to support their wives' entrepreneurial activities.

Conclusion

It is widely recognised that gender is a critical consideration when working to reduce barriers to cookstove adoption and scale. To build on this momentum globally, clean cooking sector stakeholders need to continue: (1) building the evidence that women are impacting sales and adoption rates; (2) collecting best practices and documenting most effective approaches for addressing gender and integrating women; (3) providing finance to enterprises to incentivise business models that engage women; (4) ensuring women entrepreneurs are properly supported for success; and (5) conducting advocacy to ensure that energy access is widely seen as a critical gender issue and opportunity.

Key takeaways:

— Women and men have different energy needs and priorities, and these gender differences must be taken into consideration in planning, financing, and implementing solutions. When surveyed, men often emphasise the benefits of saving money on energy costs, while women tend to emphasise the benefits of time-savings and health.
— Cooking is a culturally sensitive activity, and women's priorities may be different from those of project implementers or cookstove designers. Women must be consulted in the design of clean cooking solutions in order to ensure that the technologies are accepted, properly used, and maintained.
— Women are uniquely positioned to play a critical role in increasing awareness and creating demand. Women can serve as spokespeople in promoting and encouraging the use of clean energy products, designing and endorsing marketing messages, and taking advantage of the credibility of women-to-women communication strategies.
— When women are involved throughout the value chain, they can help ensure that energy products reflect the priorities of women users, increasing the likelihood of their adoption and long-term use. With appropriate education, training, and investment, women can build businesses around or be employed in the design, production, marketing, sale, and maintenance of new technologies and services.

For more information on the best practices and tools to engage women in the clean cooking value chain, see the Alliance's 'Scaling Adoption of Clean Cooking Solutions through Women's Empowerment: A Resource Guide' and access the tools from the Alliance website.

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Helpline

Our organisation makes and sells improved stoves in the local community. We would like to have the performance and quality of our stoves independently verified/certified, but we have very limited resources. How should we go about this?

Expert Response by Myra Mukulu

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It would be important to establish why you would like the stoves verified/certified. Some of the typical reasons businesses want to test their stoves are if they would like to participate in a carbon finance project, to build customer confidence in the quality of their products, or to provide potential financiers with confidence in the attributes of their products. In general, there are two types of stove testing: field testing and laboratory testing. Laboratory testing aims to evaluate stove performance and quality in a controlled setting, allowing for repeatability and differentiation between stoves. On the other hand, field-based tests are used to understand how stoves perform with local cooks, foods, practices, and fuels. Field tests are more useful in determining the acceptability and suitability of your products to the users and often advise product design improvements. Once you establish why you would like to test your product, you can then proceed to select how or where to test your products.

There may be more options for facilitating your stove testing, but I will present four main ones. These are:

— Testing institution certified to carry out stoves testing
— A testing laboratory
— Carbon finance project testing
— Business incubation facility

Testing with an institution, specifically certified to carry out stoves testing, gives you the opportunity to have your stoves evaluated by an institution equipped with the latest testing equipment and using the latest testing procedures as per the International Organisation for Standardisation (ISO) guidelines. It may cost more but you have the confidence that the results are acceptable to a wider range of recipients as credible and up to date because they use ISO guidelines. For instance in Kenya, testing one stove with the Kenya Industrial Research Institution (KIRDI) costs about US$ 460. A list of such institutions can be found on the Global Alliance for Clean Cookstoves (Alliance) website.

You may also explore the option of using various laboratories to test your stoves. These may be laboratories based in universities or commercial laboratories that charge a fee for testing. The only challenge about these laboratories is that you may not be sure of the kind of equipment and testing guidelines they are using for stove testing. Some of them use out of date methods and may not have the capacity to field test your stoves. If they are using ISO guidelines then you do not need to worry.

If your business has been considering involvement in a carbon finance project, then you can kill two birds with one stone. Testing of stoves in carbon finance projects is mandatory and is usually factored into the project recurrent costs. You can therefore participate in the carbon finance project whilst having your stove test costs covered. Usually carbon finance projects will test their stoves using certified institutions.

In many countries, various agencies are offering businesses support services geared at accelerating the growth and flourishing of businesses, called 'business incubation'. Some of these business incubators support stove business even offering stove testing. For instance in Kenya, the Climate Innovation Centre is offering business incubation for several stove entrepreneurs and part of this involves facilitating testing of their products. They are using the certified laboratory at KIRDI. You may want to explore whether any organisation is offering this kind of support in your country.

Expert Response by Priyadarshini Karve

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Sometimes, stoves need to be 'certified' against a national or international standard in order to be able to access funding, subsidy, tax concessions, etc. In that case, there is no option but to go through the process that may be recommended by the standard.

For example, India now has a national standard, against which any improved stove needs to be tested and certified in order to avail any benefits from government programmes. The total expense (including certification fee, stove transport, interactions with the testing laboratory, etc.) incurred for certification of a household stove model could be about US$ 1000. Most developing countries may have similar processes in place.

There are international standards such as those being developed by Global Alliance for Clean Cookstoves (Alliance) that you may need to use for a specific purpose. The cost incurred is likely to be on similar lines. However, the testing and certification expense is an investment rather than a cost.

The 'returns' may not always be financial (e.g, grant support or subsidy for the stove) but could also be in the form of being able to spread the technology to a wider user base, attaching a trust value to the technology and making it more acceptable to future funders and users, etc.

It is important to be clear about what exactly the testing/certification is being done for as it may not always be essential to go through elaborate testing processes. One big lacuna of all standard test protocols is that the user's perception of the stove hardly factors into the analysis. The cleanest and most efficient stove is not necessarily suited to a local cuisine, or is not necessarily perceived as 'user friendly'.

Therefore standard testing/certification will not ensure that the users actually use the stove and get all the benefits that they are supposed to get. It is a common despair of development agencies to walk into the home of a beneficiary, only to find them still using their traditional stove as the main cook stove, with the new improved stove being used only for peripheral tasks like making tea, or only when excess cooking is to be done.

If the intent of the testing is to ascertain effectiveness of the intervention of introducing an improved stove in a community, then based on the information being sought, separate test procedures may need to be developed and implemented. User satisfaction data can be collected with the help of carefully designed surveys and unobtrusive observations of the cooks going about their daily business. Any agency that is familiar with social impact assessments in your area may be roped in for this, and the cost incurred will depend primarily on manpower cost and sample size.

Another possible intention of testing could be to ascertain the effectiveness of the improved stove in actually delivering the claimed environmental and health benefits in the field.

There are some standard test protocols, such as controlled cooking test or kitchen performance test, that serve this purpose. However, to get the tests conducted by a properly trained third party organisation will incur costs, which may be prohibitive in some locations.

If one is doing comparative testing for internal assessment, some modified forms of such tests can be used, with the help of a local science or engineering educational institute. The advantage of using staff/ students of a science or technical institute is that they are likely to be familiar with the basics of scientific testing, data processing, etc. The limitation of this approach however is that the results obtained are relevant only to the specific conditions under which the testing was carried out, and cannot be universally applicable. Data and analysis, based purely on such customised testing, may not be acceptable for research publications. However, on the positive side, useful data is obtained at a relatively low cost.

For example, in one project our task was to ascertain the benefits of replacing a traditional stove with an improved stove in school kitchens in a region. Because of the limitation of resources, we devised a simple test of measuring fuel consumption and CO emissions at a specific distance from the stove, for performing a single task of bringing a fixed quantity of water to boil from room temperature. The same standard cooking vessel, that was in each school kitchen, was used for the test, and multiple tests were carried out in the same kitchen, to reduce uncertainties. Since the school meal consisted mainly of two food items, both cooked by boiling in water, the test was a good proxy to ascertain the utility of the new stove under actual cooking conditions. Ideally, we needed to do a 'before' and 'after' type of study – the testing to be conducted in the same kitchen with the same cook and the same cooking vessel, first with the existing traditional stove and then with the new improved stove. However this was not possible due to practical considerations. We therefore had to find nearly identical pairs of kitchens, one to be used as 'control' (no change of stove) and one to be used as 'test' (equipped with the new stove). The tests were carried out in several such pairs of kitchens. We also interviewed the cooks in the kitchens on their perception of the stoves that they used. The data collected was adequate for us to be able to conclude that the intervention would certainly help the schools in saving on the fuel cost, will improve the indoor air quality in the kitchen, and will result in happier cooks.

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Toolkit

Stakeholder Analysis

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Stakeholder analysis is a tool that is commonly used as part of the project development process and as an important input into barrier analysis. By barriers we mean obstacles that prevent movement or change in a market or social system. An understanding of the barriers is a solid foundation to a good quality project proposal or market intervention. Barrier analysis provides explanations of the existing situation and helps us to understand the market and design something that works.

The general approach

Before going into detail on stakeholder analysis, it's important to understand the general approach to planning a market assessment (see Figure 1).

Problem definition: Problem definition is important because if the right problem is chosen, the project has the potential to make a real difference, result in positive benefits, sustain market transformation beyond the life of the project and be able to be scaled up or replicated elsewhere. In contrast, if the wrong problem is chosen, the project may waste time and resources, encouraging poor entrepreneurs to invest in products that have no market. While we should consider carefully the definition of the problem that we are trying to address, tools such as stakeholder analysis help to refine the definition of the problem along the way.

Desk based scoping: Starting with a desk based scoping review will enable identification of the stakeholders in the market and and understanding of some of the opportunities and blockages. Wasted time is reduced by reviewing all the existing data before starting, thereby identifying key questions to ask and issues to investigate and test.

Research and fieldwork: Fieldwork provides valuable insights through collecting and understanding different points of views and challenging 'received wisdom'. Furthermore, when done carefully and sensitively, fieldwork builds ownership for a project. Typically fieldwork includes meetings, interviews, focus groups, and surveys, and potentially small 'experiments' to check assumptions about how markets work.

Analysis and representation: The preceding steps result in lots of data that isn't all useful, some of it possibly being contradictory. Until it is analysed and presented in an accessible form, data isn't usable and cannot be communicated to others (stakeholders, funders, etc.).

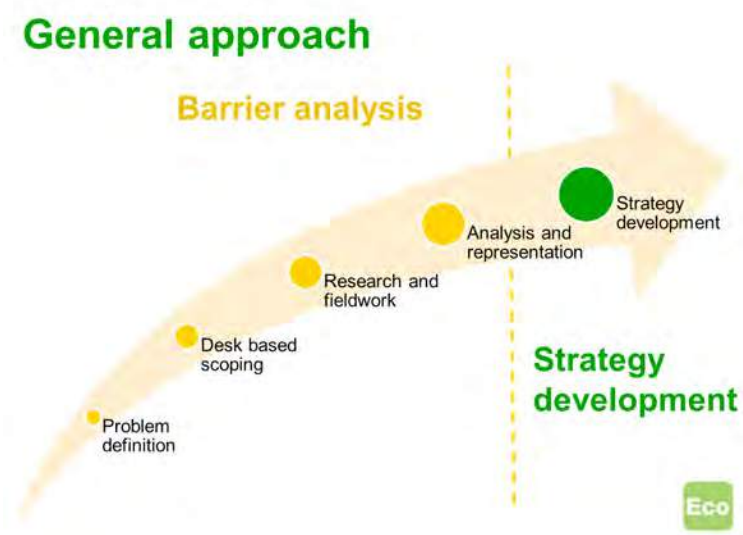

Figure 1: The general approach to planning a market assessment

Stakeholder analysis

Stakeholder analysis involves identifying and characterising major stakeholders, target groups and beneficiaries, and defining whose problems will be addressed. A stakeholder analysis is important because it:

— Identifies stakeholders' interests in, importance to, and influence over the project
— Identifies local institutions and processes upon which to build
— Provides a foundation and strategy for participation

Stakeholder analysis involves four key steps. The first, to identify stakeholders and categorise according to role or type. The second, to develop an influence-importance matrix. The third, to analyse the stakeholder's vision of their role in the sector or project and what they see as the key challenges and their options for change. The fourth, to summarise implications and make conclusions.

Step One- Identifying stakeholders: The following questions will help you to identify the stakeholders:

—Who might be effected by the project?
—Who might affect the project?
—Who might become useful project partners even though the project may also be implemented without their contribution?
—Who might become conflict partners as they may face the project as a threat for their role and interests?
—Who will anyway be involved in the project?

Table 1: The influence-importance matrix

		Importance of stakeholder to the project			
		Unknown	Little / no	Some	Significant
Influence of stakeholder over the project	Unknown	D Monitor; keep informed		B Protect their interests	
	Little / no				
	Some	C Potential risks; address their concerns		A Build relationships; involve them extensively	
	Significant				

At this stage it is better not to be limited and to try to think of all possible stakeholders. During field, stakeholder groups that may have been missed in the desk scoping, since it is quite easy to overlook stakeholders that may be critical, must be identified. For instance, in an clean stove project, suppliers of competing fuels may be conflict partners and/or vulnerable stakeholder whose interests need to be addressed. To categorise stakeholders according to their role, think through the following questions:

— Is the stakeholder group supposed to: work in the project, co-finance it, or benefit from it?
— Is it a supporting organisation?
— Does it have a controlling function, etc.? (importance and influence)

Step Two- Develop an influence: importance matrix: To develop an influence – importance matrix (adapted from DFID, 1993), the importance and influence of each stakeholder identified in Step 1 must be considered. 'Influence' is the power a stakeholder has to facilitate or impede the achievement of an activity's objectives. 'Importance' is the priority given to satisfying the needs and interests of each stakeholder.

In a clean stoves programme, for instance, local politicians may have a great 'influence' over a programme by facilitating or impeding the allocation of necessary resources, while urban poor women may have very little power to influence the outcome of the activities. At the same time, for a market oriented stove programme, local politicians may have very little 'importance' as far as the activity is concerned (it is a commercial activity that is not designed to meet their needs), while poor women are central and very important to it.

Step Three- Analyse the stakeholder's vision of their role in the sector or project and what they see as the key challenges and their options for change: Primarily through field work, consisting of interviews and focus group discussions, an analysis of the stakeholders own vision of their role in the sector or project must be undertaken. This work should focus on stakeholders from the A, B and C boxes.

Create the matrix by placing the identified stakeholders into Table 1. Boxes A, B and C are the key stakeholders of the project. The implications of each box is as follows:

Box A: Stakeholders with a high degree of influence on the project, who are also of high importance for its success. This implies that the implementing organisation will need to build good working relationships with these stakeholders to ensure support for the project.

Box B: Stakeholders of high importance to the success of the project, but with low influence. This implies that they will require special initiatives if their interests are to be protected. An example may be traditionally marginalised groups (e.g. rural poor women), who might be beneficiaries of a new service, but who have little 'voice' in its development.

Box C: Stakeholders with high influence, who can therefore affect the project outcomes, but whose interests are not necessarily aligned with the overall goals of the project. They might be administrators, for example, who can exercise considerable discretion over funding disbursements. This implies that these stakeholders may be a source of significant risk, and they will need careful monitoring and management.

Box D: Stakeholders, with low influence on, or importance to the project objectives, may require limited monitoring, but are of low priority.

Stakeholders should be asked explicitly about their vision of their organisation's role in the relevant sector, and in the proposed project. At the same time, who they see as main important stakeholders (e.g. who do they mention first, most often, and as most influential) must be identified, as well as what their relationship is with these, for example in terms of: hierarchy, politics, financial flows, influencing channels and media of communication. Other questions to consider include:

— What do they see as the key challenges or barriers?
— What challenges or barriers do they themselves encounter?
— What are the prospects for change? Is the barrier seen as robust, malleable - what does the actor see as conditions for changing/reducing/eradicating the barrier? What are the prospects for change, including conditions for barrier removal?

Step 4- Summarise implications and make conclusions: In the final step of stakeholder analysis the implications of the analysis on the design of the project should be summarised and conclusions on how to engage with them, should be drawn. One way of doing this is to decide, for each stage or component of the project, which stakeholders should be i) Informed, ii) Consulted or iii) Involved (as a participant or as an implementer). This could then be turned into a form of stakeholder participation matrix.

Author profile

Dr Grant Ballard-Tremeer is the Founder and Director of Eco Ltd, a boutique consultancy in the UK that specialises in the design of sustainable energy market interventions in Africa, Asia and Eastern Europe. Grant has assessed market barriers and formulated projects in over 80 countries for organisations such as IFC, World Bank, EBRD, AfDB, UNDP and UNIDO. He has a Masters in Energy Policy and a PhD in Clean Cookstove Engineering, and is a Trustee of HEDON and Editor of Boiling Point.

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The Barriers Project: Understanding the barriers to the introduction and uptake of clean/improved cookstoves in Southern Africa

Rationale

It is estimated that 2.7 billion people worldwide rely on biomass fuels to meet basic cooking and heating needs. Many of these people continue to cook on traditional three-stone fires, often inside their homes, or in kitchen spaces that have inadequate ventilation. As well as being fuel inefficient, women, children and communities are exposed to harmful levels of wood smoke. Improved cookstoves (ICS) – designed to burn biomass fuels more cleanly and efficiently – have been promoted by charities and governments in developing countries since the 1940s. Although some countries in East Africa have successfully adopted ICS, uptake in countries such as Malawi, Zambia and Mozambique has been less spectacular. Reasons for failure include cost of the stove, cultural resistance to change, availability of alternative fuel and a failure to understand users' needs.

Aim

The Barriers project is a three-year project that aims to investigate why ICS have had relatively little penetration in Southern Africa compared to Eastern Africa. It will develop a range of targeted resources for a variety of actors, including policy makers, market-based organisations and supporting services, in Southern Africa to address this, through predominantly South-South technology and knowledge transfer.

Approach

This research is embedded in the socio-technical transition debate and has input from engineers, social scientists, NGOs and academics. This multi-disciplinary research will use a variety of mixed/participatory methods to better understand the barriers to the uptake of improved cooking technology. Countries to be studied include: Kenya, Uganda, Tanzania, Zambia, Malawi, Mozambique and South Africa.

Contact us

Are you a stove producer, manufacturer, distributor, retailer or end-user? If you have a stove story you would like to share with us please email: charlotte.ray@nottingham.ac.uk or write to us at: The Barriers Project, c/o Dr Mike Clifford, The University of Nottingham, University Park, Nottingham, NG7 2RD, UK.

Picture 1: Women still use a traditional three-stone for a variety of reasons including, convenience, tradition and finance (Source: Charlotte Ray and Maria Beard)

Picture 2: Barriers Team visiting Lion Alert in Livingstone Zambia, an organisation that produces and distributes locally made rocket stoves to households in the Dwamba Forest Region, November 2014

Preliminary Fieldwork 2014

Picture 3: With support from SNV, Mama Shigelle (based in Misungwi District, Northern Tanzania) has been able to increase ICS stove production with skills such as business model development, finance and record keeping and therefore has been able to expand her business and infiltrate a variety of markets in the stove sector

Picture 4: The purchase of both wood fuel and charcoal in urban areas in Northern Malawi has meant that households still use a variety of stoves depending on availability and price of fuel

Picture 5: ICS producers in the village of Didi in South Malawi are very much aware that their products must be of quality and meet ICS standards as identified by the National Cookstove Taskforce. Here, two producers are making sure that the clay Mbaula base is moulded to its specifications before it is dried and then fired in the kiln

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* Additional information on the Barriers Project

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USES Network

Picture 1: USES Workshop London, 2014

Picture 2: Discussions at the READ workshop, Kigali, 2014

The LCEDN USES Network: Crossing Boundaries, Breaking Barriers

The Barriers project is one amongst 12 projects funded through the EPSRC/DFID/DECC research programme Understanding Sustainable Energy Solutions (USES), initiated in 2012 as a suite of research projects to develop understanding of the nexus between clean, low carbon energy, resilience and wealth creation amongst low-income households and communities across the Global South. The projects take very different approaches to doing this, but all have the broad general aim of researching the opportunities and challenges associated with scaling up clean energy transitions and the move to low carbon economies. A core feature of the programme is that it has promoted the formation of research teams which (a) combine technical specialisms with social science expertise, (b) integrate Northern and Southern academic researchers and (c) develop partnerships between the academic community and colleagues from NGOs, state institutions and the private sector.

Barriers is the only one of the USES projects specifically addressing the uptake of improved cookstoves (ICS), but several projects touch on related issues or include domestic cooking as part of a wider focus on policy issues. For example, the Renewable Energy and Decentralisation (READ) project is exploring the role of local government in promoting low carbon transitions as a key component of decentralisation processes in Rwanda and Kenya. This involves looking at the role of different tiers of local government in promoting the use of different clean energy technologies including cookstoves, different fuel types etc.

In Rwanda, more than a decade of decentralisation has developed a system for promoting the uptake of cookstoves produced by cooperatives, although some interesting tensions have emerged. These include the juxtaposition of decentralisation within a powerful, centralised state, and home-grown initiatives competing with large-scale projects promoted by overseas NGOs importing higher quality stoves.

In Kenya meanwhile, recent decentralisation processes have seen new county governments assigned significant statutory responsibilities in terms of energy issues. Recent workshops with NGOs, small businesses and county officials however portray considerable confusion over the role of the new county governments. Problems include defining who has responsibility for promoting clean energy, a lack of dialogue between the new authorities and energy sector actors, but most importantly a lack of capacity (in both knowledge and resources) within the new country structures for planning and implementing their new responsibilities.

The first annual USES workshop was held in June 2014 with the UK Collaborative on Development Sciences, specifically targeted at exploring the whole question of 'impact' and 'engagement' in academic research. The workshop featured a variety of research users, challenging presentations on impact planning, public engagement and theories of change and discussion over the expectations of research funders. There were also presentations and discussions on the successes and limitations of previous projects that participants had been involved in, as well as opportunities for collaboration between the various project teams going forward.

Interested readers can find out more about the various USES projects by visiting: http://www.lcedn.com/uses

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* Additional information on the USES Network

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The Alliance set to transition into Phase 2 of strategic plan

In 2011, the Global Alliance for Clean Cookstoves (Alliance) released a comprehensive sector strategy in its groundbreaking report 'Igniting Change: A Strategy for Universal Adoption of Clean Cookstoves and Fuels'. The subsequent Alliance three phase strategic business plan provides a clear roadmap for the creation of a dynamic market for clean cooking solutions. In 2014, as we come to the end of Phase 1, enormous progress has been made and the Alliance has surpassed many of its original goals. To date, more than 20 million cleaner and more efficient cookstoves are in use and global awareness of the serious issues posed by household air pollution is growing rapidly.

While Phase 1 of our efforts was dedicated to launching global and in-country efforts to rapidly grow the sector, Phase 2 will focus on driving investments, innovation, and operations to scale, with an ambitious goal of enabling 60 million households to adopt cleaner cooking solutions by 2017.

Building on momentum from Phase 1 achievements

Our Phase 2 goal will build from the solid foundation of achievements we accomplished in Phase 1, which include:

— Grown from 19 partners to more than 1000 active partners across six continents, including 45 national governments, 12 UN agencies, major global corporations, hundreds of small- and medium-sized enterprises, foundations, investors, researchers, women's groups, and scores of non-governmental organisations.
— Launched a suite of Country Action Plans and built momentum among government leaders in our focus countries of Bangladesh, China, Ghana, Guatemala, India, Kenya, Nigeria and Uganda.
— Drove US$ 50 million in grant funding for Secretariat activities that have enabled a stronger market and another US$ 50 million in investment into the sector at large.
— Established the Spark Fund, Women's Empowerment Fund, and the Pilot Innovation Fund to support the development of commercially viable enterprises and encourage innovations in design, manufacturing and distribution of clean cookstoves and fuels.
— Led the International Organisation of Standardisation (ISO) process to create the first-ever international guidelines for cookstove safety, efficiency and cleanliness.
— Supported regional testing and knowledge centers (RTKCs) in 13 countries across Africa, Asia, and Latin America and coordinated knowledge training and staff development to strengthen a broader network of RTKCs that can provide high quality testing services for the sector.
— Raised global awareness of the issue through more than 100 global, national and local media outlets and mobilised hundreds of experts, authorities and influencers to help address this issue.
— Directly and indirectly supported numerous competitive research grants in the areas of child survival, climate change, fuels research, gender impacts and clean cookstove and fuel adoption.
— Commissioned 19 market assessments and 3 consumer segmentation and preference studies.
— Created several high-impact resource guides and web portals including the Clean Cooking Catalog, Gender Online Knowledge Hub, Partner Country Toolkit and Carbon Finance Platform.

Focus on scale in Phase 2

As we move into Phase 2, the Alliance will continue to leverage the broad reach and depth of our partner base to achieve our goal of a thriving global market for clean cookstoves and fuels at scale.

In addition to emphasising scale, Phase 2 also marks a significant shift towards demand creation, while continuing to strengthen supply and foster the enabling environment. The Alliance will continue to commission research to strengthen the knowledge base on the needs and preferences of consumers around cookstoves and fuels, and will build on this information to launch targeted awareness raising campaigns in our focus countries to increase public visibility of the issue of household air pollution and drive demand for and adoption of cleaner cooking solutions.

We will also work to make these cleaner solutions more affordable to those who need them by brokering partnerships with financial institutions and facilitating guarantees and new consumer financing products and delivery models. We plan to work to increase accessibility of clean cookstoves and fuels by strengthening existing last-mile distribution channels and leveraging new ones by funding pilots, building capacity for enterprises, and compiling and sharing best practices.

As demand for clean cookstoves and fuels grows, supply will need to keep pace to ensure consumers are able to purchase the products they want and need. The Alliance will continue to engage in a graduated approach to provide and drive financing and direct enterprise capacity building, with support mechanisms ranging from early stage grant funding, through subsidised capital, to angel equity, and ultimately commercial capital. Our Phase 2 efforts will also reflect an increasing emphasis on promoting technology innovation for increased stove and fuel performance and benefits to be realised at scale.

Alliance support for improved stove and fuel performance will also continue via our leadership in the ongoing ISO process to firmly establish standards for the sector to ensure that technologies achieve the desired benefits for health, livelihoods, and environment. The Alliance will also ramp up efforts to roll out certification and labeling in our focus countries to

ROADMAP FOR PHASE 2

The Alliance's strategic plan includes a goal for 60 million households to adopt cleaner and more efficient cookstoves and fuels by 2017. These strategies will raise awareness to create that demand, bring smart products and ideas to market, build the evidence base for clean cookstoves and fuels, and fully engage impact investors. Working with its partners, and following this action plan, the Alliance will make great progress towards defeating this silent killer.

2015

20 MILLION HOUSEHOLDS ADOPT CLEANER AND MORE EFFICIENT COOKSTOVES AND FUELS.

We are already ahead of our Phase 1 target.

Launch public awareness campaigns in all eight focus countries. National and local champions drive home our messaging.

Work with at least three financial institutions in each focus country to support consumer finance and develop products that will enable families to move up the energy ladder.

Promote certification, labeling, and testing programs in accordance with ISO standards.

Make investments to strengthen at least four different fuel supply chains across focus countries.

DEMONSTRATE THE LIFE-SAVING IMPACT OF CLEAN COOKING INTERVENTIONS. STUDIES ON CHILD SURVIVAL, BURN FATALITIES, AND CARDIOVASCULAR AND LUNG DISEASE CONTINUE TO BUILD THE EVIDENCE BASE.

Increase efforts to drive private investment in the sector and encourage financial institutions to allocate capital for clean cookstoves and fuels enterprises.

Help provide access to clean cooking solutions for 5 million people in refugee camps and other humanitarian contexts.

BUILD A STRONG GLOBAL NETWORK FOR EVALUATION OF RESEARCH.

CONTINUE TO DEVELOP A PIPELINE OF INVESTMENT-READY ENTERPRISES THROUGH THE SPARK, PILOT INNOVATION, AND WOMEN'S EMPOWERMENT FUNDS.

Pursue meaningful policy and regulatory reforms to optimize the clean cookstoves and fuels market, especially in focus countries.

Use research results to continue to demonstrate the environmental and climate benefits of clean cooking. Affirmation of global energy goals in Post-2015 SDGs, Beijing +20, and Sustainable Energy for All will increase our profile and momentum.

The global health community will fully embrace and act on the issue of household air pollution.

2017

60 MILLION HOUSEHOLDS ADOPT CLEANER AND MORE EFFICIENT COOKSTOVES AND FUELS

PROJECTED IMPACTS

- **110,000** lives saved
- **25,000** children's lives saved
- **430,000** sector jobs
- **350 million** trees saved
- **310 million** metric tons CO_2 emissions saved

Figure 1: Roadmap for Phase 2

Figure 2: Cookstoves Future Summit

ensure adherence to global standards and allow consumers to make informed choices. We will also continue to support robust research demonstrating the negative health, environmental and gender impacts from the use of solid fuels in open fires and traditional cookstove, and the net benefits of cleaner and more efficient options.

Finally, the Alliance will continue to serve as a convener and knowledge hub for the sector, with plans to unveil a new website this fall with expanded resources and information for our partners. Preparations are now underway for our next biennial forum, with rotating regional meetings and increased in person trainings and other online and offline opportunities for partners to receive capacity building and networking opportunities slated as well.

Cookstoves Future Summit to mobilise commitments

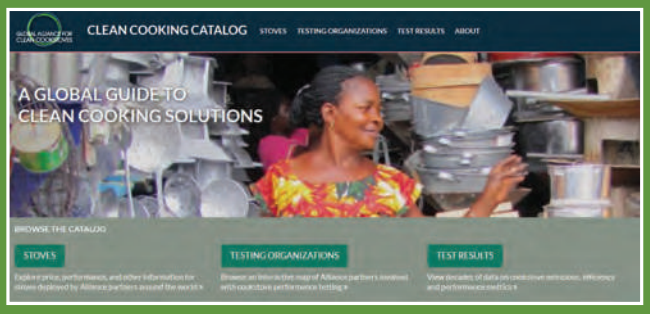
The Alliance's ambitious goals for Phase 2 will require strong political and financial commitments from the global community. We have set a goal of mobilising US$ 500 million in public and private investment, as well as in-kind commitments, to meet the needs of the Alliance and the broader clean cooking sector.

To achieve this objective, the Alliance recently held a high-level invitation-only conference - Cookstoves Future Summit - on November 20 & 21, 2014 in New York City. Impacts from the high-level meeting include commitments from donor and implementing nations for concrete financial and policy/programmatic actions, as well as specific and significant commitments from leading corporations, foundations, investors, and UN agencies to mobilise the clean cooking sector and advance cost-effective market-based policies and programmes that reduce the use of open fires and traditional cookstoves and lead to measureable improvements in health, environmental, gender, and livelihoods.

The Alliance will publicise all financial, in-kind, and programmatic pledges made on behalf of the clean cooking sector by Summit participants, so stay tuned for exciting outcomes from this milestone event to transform the way almost half the world cooks.

GLOBAL ALLIANCE FOR CLEAN COOKSTOVES

Global Alliance for Clean Cookstoves Featured Resources



The Clean Cooking Catalog is an online global database of stove and fuel performance, including information on stove features, design specifications, emissions levels, efficiency, and safety from both laboratory and field-testing. The Catalog is built from partner-submissions and serves as a living resource to document progress within the clean cooking sector.

catalog.cleancookstoves.org

The Carbon Finance Platform is a comprehensive and interactive knowledge sharing platform built by the Alliance to provide how-to guides, tools, templates, and case studies to assist stakeholders with varying levels of carbon expertise. The platform serves as an interactive marketplace for multiple audiences and base-line knowledge levels, including new and experienced project implementers, carbon developers, as well as donors, investors, and carbon credit buyers.

carbonfinanceforcookstoves.org

Scaling Adoption of Clean Cooking Solutions through Women's Empowerment: A Resource Guide is a comprehensive guide for practitioners to overcome common constraints and implement best practices when integrating women into the clean cooking value chain. The guide features a series of detailed case studies that highlight challenges and lessons learned by key Alliance partners, and includes stories of individual women and their roles in bringing change to the sector.

cleancookstoves.org/our-work/gender-guide.html

The Partner Country Toolkit provides the tools and resources needed for Alliance partners to: assess the current state of the cookstoves and fuels market in a given country; identify barriers and develop an action plan to overcome them; create engagement and communication plans; adopt technology standards; drive investment and scale enterprises to meet consumer need; track and report progress to evaluate success and areas for improvement; and learn from the progress and challenges of other countries.

cleancookstoves.org/resources_files/partner-country-toolkit.docx

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Picture 1: A Kenyan cook demonstrates the improved cookstove introduced by community sales agents in the Johns Hopkins University research study

Picture 2: A member of a Women's Savings & Credit Group in Himachal Pradesh, India cooks on an improved LPG cookstove

The Alliance Gender Research Group

The Gender Research Group organised by the Global Alliance for Clean Cookstoves (Alliance) is an informal network of researchers and organisations interested in gender and clean cooking solutions. The group was created to share best practices for conducting research on the gender impacts of cookstove and fuel adoption, as well as research on the role women play in scaling adoption. The Alliance and its partners understand that women play a crucial role in the widespread adoption and use of clean cookstoves and fuels because of their central responsibility for cooking and managing household energy.

The group serves as a virtual platform for discussion surrounding the engagement and support of women in cookstove and fuel initiatives, as well as understanding the most effective gender-informed business models for strengthening gender impact and scaling adoption. Group convenings include presentations of research being conducted, methodologies utilised, and innovative approaches addressing gender issues, gaps, and opportunities. This shared space allows for continual collaboration and synergy on research studies, and allows researchers and practitioners alike to take advantage of each other's experiences, lessons learnt, and knowledge.

Several members of the group are conducting Alliance-funded studies examining gender-related research questions. The studies analyse the impacts of women's engagement in the cookstove value chain, looking at factors such as fuel savings, reduction in drudgery, time savings, and health improvements.

For example, Practical Action is conducting a regional study in India, Nepal, and Bangladesh and found higher school enrollment among clean cookstove user households compared to traditional cookstove users. The results also show higher adoption rates among women who are members of social groups, such as savings and credit groups. Additionally, with support from the Alliance's Women's Empowerment Fund, The Paradigm Project is testing interventions aimed at increasing the number of women engaged in their EzyAgent programme. This pilot project will help demonstrate that women are able to excel in sales positions and will identify best practices for women to be successful sales agents.

Two other Alliance gender studies are focused on the impact women have on adoption when engaged in the value chain. In these studies, Johns Hopkins University (JHU) and CEDESOL are also testing the impact of innovative empowerment and leadership training on ICS entrepreneurs. In Kenya, JHU found that entrepreneurs who participated in empowerment training were almost three times more likely to be active sellers, and being female or living in an urban area more than doubled the likelihood of being an active seller. Results from CEDSOL's study in the Andean region show that time savings for women entrepreneurs who received training led to increased engagement in income-generating activities, as well as reported health benefits such as decreased smoke exposure and frequency of burns from cooking.

The Alliance and its partners are building the evidence base on the gender impacts of adoption of clean cooking solutions, as well as the impacts women can have on scaling the sector across the value chain. Collaboration and coordination among researchers and organisations focused on gender and energy is integral for achieving the shared goal of building the evidence on the impacts of gender mainstreaming and identifying best practices in the improved cooking sector.

www.HEDON.info/NWXB

* Additional information on the Gender Research Group

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Ashden: Rewarding and supporting sustainable energy trailblazers

Ashden is a charity that champions and supports sustainable energy pioneers, and is a partner on the Barriers project.

The annual Ashden Awards ceremony in May was the highlight of our 2014 calendar, where we made Awards to 14 sustainable energy trailblazers in the UK and across the globe. These included the Clean Energy for Women and Girls Award, supported by DFID, which went to Greenway Grameen, a clean cookstove business founded and run by two young Indian engineers. Their priority in designing a cleaner, more efficient wood stove was "what do our customers want?" rather than "how can we persuade them to want our design?" The effectiveness of this approach shows in their achievements: over 120,000 sales in the two years since their 'Smart' stove was launched.

Greenway is using its £20,000 prize money to increase sales by investing in its supply chain and involving more women to sell and distribute the stoves. And an Ashden Award is much more than just a prize. Our Communications team work hard to gain media coverage for winners. Neha Juneja, one of the founders of Greenway Grameen. was interviewed by BBC Radio 4's Woman's Hour and Zee TV as well as receiving over 20 items in print and online media in the weeks following the Award.

We also provide tailored support to help winners take their work further. For example, Greenway identified that its website could do more to include product information and promote sales, so working with Ashden, it is contracting a leading digital marketing company in India to improve its website, including providing a facility for retailers to buy samples of stoves online.

In June, Ashden and Christian Aid launched a research report on the type of external support that energy access enterprises like Greenway Grameen need. We carried out the research by interviewing the experts: the enterprises themselves. One theme that emerged was the general need for finance in the form of working capital, another that more support was needed for sales and marketing. Christian Aid and Ashden will use this work to guide their own support to enterprises, and full details are available from the Ashden website.

We are now working with ENERGIA on a DFID-funded research project to review and analyse the impact that of work of past Ashden Award winners on the lives of women and girls.

And finally, we have just closed our call for entries to the 2015 Ashden Awards. For our International Awards we are looking for pioneering work in sustainable energy access; low-energy buildings; innovative financial or business models to deliver sustainable energy; sustainable energy for agriculture; and work that improves the lives of women and girls through sustainable energy.

Picture 1: "The time saved by the Smart stove is more valuable to most people than the money. We're always very short of time." Shyama Saroj, Greenway customer, Jagdish Nagar, near Nagpur (Source: Martin Wright/Ashden)

Picture 2: Greenway marketing materials use well-known actors to focus on the aspirations of customers rather than their 'needs'

www.HEDON.info/PWXB

* Additional information on Ashden

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Picture 1: The Rocket stove prototype and shea butter producers (to be introduced and studied within the shea butter value chain in Mali)

Picture 2: Diversifying skill set (a wood ceramic stove that could compete with the 3-stones fire, the only wood stove in Sierra Leone)

Picture 3: The Sierra Leonean stove market (most of them were tested by Renewable Energy Center and Stove*Plus* team)

Stove*Plus* Africa

Stove*Plus* is a global initiative of GERES that benefits from its 20 years of stove experience, yet has a different approach and mission. Indeed, Stove*Plus* is not a project implementer, but a stove neutral advisory entity. The programme operates in two regions: Asia and Africa. It offers adapted solutions for local entrepreneurs, government entities and programme implementers in the field; to develop practical and applicable cooking devices that extend beyond household kitchen use to improve livelihoods and generate income. Rather than focusing on household stoves alone, Stove*Plus* looks at the energy consumption chain and provides solutions focused on cooking devices and technologies that can reduce fuel, improve health and increase economic livelihoods. Stove*Plus* and collaborating partners measure their impact and results by producing quantifiable comparisons of pre- and post-intervention with both laboratory and field testing. In fact, Stove*Plus* prioritises the strengthening of local capacities on international testing methodologies.

Officially launched at the beginning of 2014, Stove*Plus* Africa quickly built partnerships and networks. It has opted to turn part of its focus on looking at agro institutional fuel consumption and generating measurable evidence of the impact improved cookstoves (ICS) can have when integrated into these processing to replace existing energy needs.

In Sierra Leone, Stove*Plus* provides technical and advisory assistance, training local and government representatives on testing protocols in order to develop cookstove markets with standardised clean cooking devices that match end-users' needs and habits. After completing testing in Sierra Leone, Stove*Plus* Africa held a workshop with traditional and ICS producers explaining the testing process and results, and providing feedback on simple cost effective ways to improve each stove type tested. In addition to working on testing and quality improvements of household stoves, Stove*Plus* Africa works with local entrepreneurs to develop improved biomass agro processing devices which then are piloted in the local community prior to being fully commercialised.

Upcoming activities for Stove*Plus* Africa include completing an energy market assessment (fuel and ICS) in Ivory Coast and testing the viability of integrating institutional cookstoves into the shea butter value chain. In the coming weeks, the Stove*Plus* – GIZ study 'Building Business Cases to Reach Scale: A Study on Biomass Cookstove Business Models in Asia and Africa' will be published. It will showcase some interesting business models and approaches used to produce and disseminate ICS across Africa, in particular in Kenya, Ghana and Burkina Faso. In December 2014, StovePlus Africa will host the StovePlus Academy, a five day workshop for African entrepreneurs working within the ICS and clean energy sector. The event will be held in Kenya and will expose entrepreneurs to diverse cooking devices and production equipment. The aspired outcome is to increase Africa's collaboration and knowledge about the industry and to strengthen African entrepreneurs' capacity to diversify the production of improved biomass cooking devices.

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Picture 1: A woman working for a stove producer, Kampong Chhnang, Cambodia

Picture 2: A1 stove, Bagan region, Myanmar

Stove*Plus* South Asia

In South Asia, Stove*Plus* is actively engaged in three major national-scale projects. In the Republic of the Union of Myanmar, the team is involved in a European Union project and working in collaboration with the Burmese government and local partners to scale-up cookstove dissemination in the country.

Through the adaptation of best practices and lessons learnt from Cambodia, Stove*Plus* is providing services to coach EGG, a Burmese stove producer, to enhance their clean cookstove business. To reproduce the Cambodian success story, Stove*Plus* brings GERES' experience and expertise, and will facilitate exchanges with actors on the field to adapt methodologies and techniques to integrate end-users' needs and preferences in the production of improved cooking devices.

The involvement of the government in the project is essential to remove institutional barriers and to implement a framework to enhance cookstove quality in the sector. The Burmese Department of Forestry is a key partner in moving forward.

Re-equipping the existing lab; training the team on internationally recognised and more adapted tests; and gathering the producers and resellers of the cookstove sector are some of the actions planned to strengthen and enhance the clean cookstove market in the Republic of the Union of Myanmar.

In Indonesia, Stove*Plus* is involved in the Clean Stove Initiative (CSI) as a technical partner. The local government and the World Bank, the project owner, aim to strengthen the sector for the cookstove market in order to offer cleaner and more efficient devices to the end-users.

An anthropological study highlighted the end-users' cooking habits and customs to adapt the tests.

A laboratory in Yogyakarta has been re-equipped and is now operational for the Heterogeneous Stove Testing Protocol. The team is now testing stoves and scoring them according to selected criteria. Conforming to these criteria, a scoring system has been set-up to evaluate the devices and the cleaner and the more efficient the cookstove is, the bigger the subsidy will be. This will encourage the production and/or distribution of cleaner and more efficient stoves. The next step of the project is to identify and coach local businesses to help them strengthen and develop their commercial activities.

Finally, the project aims to raise awareness on the benefits of a clean cooking environment to increase the adoption of clean cookstoves by the population. In Lao PDR, Stove*Plus* is finalising the second phase of the CSI project from the World Bank. After collecting data and analysing how stoves are produced and what are the end-users' habits and expectations, the project developed a testing process, and standards and labels to enhance the cookstove market to offer higher quality devices on the market. The team has trained two producers in Vientiane and they have produced more than 200 units until now. Fifty families were involved in testing the stoves and gave feedback about the devices. The results have been very encouraging and they all have adopted the devices.

www.HEDON.info/QWXB

* Additional pictures

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New publications

The Kaleidoscope of Cooking

The usage rate of improved cookstoves (ICS) among Indian households is low despite their potential in reducing both biomass consumption and negative health impacts due to indoor air pollution. One of the key reasons for the lagging uptake of ICS lies in the difficulty in promoting a cooking technology that suits the user needs. Such a choice must be based on the socio-economical and geographical contexts of a cookstove intervention.

In order to facilitate the selection procedure, GIZ published a study entitled 'The Kaleidoscope of Cooking' under the Indo-German Energy Programme (www.igen-re.in) and the Ministry of New and Renewable Energy (MNRE). The study provides insights into the cooking patterns and consumer preferences for ICS in the Indian states West Bengal, Bihar and Uttar Pradesh. Besides helping to identify appropriate clean cooking technologies, the report also includes suggestions from cookstove users in rural areas on how to improve existing cookstoves to better meet their individual requirements. The study is available for download via @HEDON.

Revised edition of the Biomass Energy Sector Planning Guide (BEST)

The Biomass Energy Sector Planning Guide is a revision of the Biomass Energy Strategy (BEST) Guide published by EUEI PDF and HERA in 2011. As a full biomass strategy may not necessarily provide the right output in every context, the scope and set-up of the guide have been changed to allow for a user-based strategy development that allow a pre-determined steering committee to choose and pursue a biomass energy sector plan that is suitable for the according context. As its predecessor, the guide is based on experience mostly from African countries but with relevance beyond. The methodology can be applied in all countries where biomass is the main fuel for households and small enterprises. The revised edition of the BEST-Guide can be downloaded via @HEDON.

Can Carbon Revenues help transform Household Energy Markets?

Carbon finance is considered as an attractive source of revenue for scaling up cookstove dissemination projects in many regions of the world. The Stockholm Environment Institute (SEI) therefore conducted a study on the question "Can carbon revenues help transform household energy markets?" with financial support from GIZ HERA. The study specifically explored the potential of carbon finance in scaling-up cookstove projects, through the Clean Development Mechanism (CDM) or through voluntary markets. As little research exists on this topic so far, project design documents were reviewed and interviews with relevant stakeholder chains were conducted in two country case studies – India and Kenya. It was found that carbon finance can indeed play a valuable role in supporting the further dissemination of ICS. The study on carbon revenues is available via @HEDON.

New Village Management Team Training Manual by GIZ Indonesia

Electrification using renewable energy sources has become an important component of many rural development projects. However, the skills required for maintaining these power plants often exceeds local capacities. The use of external experts is time consuming and costly and has in many cases led to long-term faults in the systems.

In order to allow for local communities to manage their own power systems, GIZ Indonesia has developed a Village Management Team Training Manual to be used in the context of rural electrification projects. The Manual focuses on small hydro and solar power plants and is divided into three modules that contain specific tools, activities and references required to implement training segments. By providing a systematic approach on how necessary skills for maintaining small hydro and solar power plants can be transferred to the local community, this manual fills an important information gap in the implementation of rural electrification projects. Please contact Caspar Priesemann if you would like to obtain a digital copy of the guide.

GOGLA Investment and Finance Study for Off-Grid Lighting

GIZ supported GOGLA in a seminal research project on the investment potentials and financing needs in the off-grid lighting product market. The study that was produced as a result is part of HERA's contribution to on-going efforts by stakeholders who aim to attract more investment in the off-grid lighting sector. It was found that the potential customers currently invest approximately US$ 30 billion per year for buying kerosene to meet their lighting purposes. In contrast, the cost of an equivalent supply with solar equipment is estimated at US$ 2.7 billion. The study was prepared in collaboration with A.T. Kearney, Quadia, Solar Energy Foundation, and SolarAid. A launch event in Zürich was organised that brought together key impact investors, development finance institutions and boutique asset management companies. The study can be accessed via @HEDON.

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Picture 1: A woman from Bihar using an improved, transportable, cookstove

Events

India Clean Cookstove Forum, November 10 – 12, 2014

We are pleased to announce that the India Clean Cookstove Forum (ICCF) 2014 took place for the second time from 10-12 November in New Delhi. The ICCF is a joint event by the Ministry for New and Renewable Energies (MNRE) and GIZ. The event brought together practitioners, project developers, investors, banks, researchers, social enterprises, government and donor agencies, foundations and NGOs to discuss the steps necessary to tackle the challenges hindering a large-scale adoption of ICS in India.

The India Clean Cookstove Forum 2014 strives to build on the great success of last year's forum when the participation of more than 150 stakeholders made it the largest national event to promote clean cooking solutions in India ever held.

Please refer to the website (www.igen-re.in) for information on GIZ cookstove activities in India. Further information on the workshop will be published soon. Alternatively contact christian.liedtke@giz.de

Household Air Pollution addressed at Better Air Quality 2014 in Colombo, Sri Lanka (19– 21 November 2014)

To combat the deadly challenge posed by household air pollution, GIZ HERA together with the Global Alliance for Clean Cookstoves (Alliance), Clean Climate and Air Coalition and the World LPG Association hosted a side event during the Better Air Quality conference that took place in Colombo, Sri Lanka, from 19-21 November. The one-day event brought together stakeholders who discussed the causes and effects of household air pollution. The event aimed at raising awareness on household air pollution and foster knowledge exchange on both, the relevance and possible solutions for reducing HAP in the region.

Platforms

Launch of a High Impact Opportunity on clean energy mini-grids at SE4All Forum

Together with leading international organisations from the public and private sector, GIZ set up a High Impact Opportunity (HIO) on clean energy mini-grids under the framework of the UN-Initiative Sustainable Energy for All (SE4ALL). The mini-grid HIO will use the international framework of SE4ALL to enable, enhance and promote existing and upcoming efforts in the sector with a view to an improving deployment rate and market transformation impact. The HIO will pursue the following five goals:

1. Support the integration of clean energy mini-grids within national and international energy plans and regulations
2. Increase the coordination and interaction in the mini-grids sector by drawing in new partners, enabling increased partnerships, joint ventures and cross-sectoral projects
3. Create agreement over and knowledge of key concepts, techniques, technologies and approaches, supporting improved performance across the clean energy mini-grids sector
4. Increase the development and testing of business models through High Impact Initiatives (HIIs) and increase the visibility of outcomes via transparent evaluation and reporting
5. Increase the visibility and recognition of clean energy mini-grids as a viable electrification approach with a view to increasing the availability of private and public financing.

A coordination group including Alliance for Rural Electrification (ARE), GIZ, EU Energy Initiative Partnership Dialogue Facility (EUEI PDF), United Nations Foundation (UNF), United Nations Environment Programme (UNEP), UK Department for International Development (DFID) and the SE4All Global Facilitation Team (GFT) will guide the activities of the HIO during the first year of its operations. GIZ will be coordinating jointly with UNF the activities of the HIO and is supporting the establishment of an HIO Secretariat which will be hosted by UNF and ARE. A wider membership is invited. More information can be found on the HIO via@HEDON. Please contact bozhil.kondev@giz.de if you would like to participate.

www.HEDON.info/RWXB

* Web links to extended news items
* News from GIZ partners

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New HEDON Trustees

Raffaella Bellanca

Raffaella is an access to energy and communication consultant, focussed on pro-poor energy delivery models and the development of sustainable value chains. She recently co-authored a book on 'delivering energy for development' and a guideline tool on 'delivery models that work for people living in poverty'.

Raffaella has worked in the energy field for nearly 20 years. She researched combustion processes in power plants and car engines and also worked as a cleantech entrepreneur experiencing start-up company incubation first hand. Raffaella has previously lead the HEDON Household Energy Network and is still very much interested in knowledge sharing and collaborative systems for the diffusion of innovations. She holds a PhD in Combustion Physics a MSc in Environmental Physics and a Master in Communication for Development.

Jack Dedman

Jack is a member of the Institute of Chartered Accountants in England and Wales and holds a degree in Philosophy from the University of East Anglia. Jack works in public practice and has over six years experience in delivering internal and non-audit accounting services, principally in the Central Government and Charity sectors. Jack's particular focus is on financial regularity, internal control, risk management and governance.

Jack has a keen interest in people development and has run a number of training and induction programmes for graduates at his accounting firm. Jack is a career coach within his firm and is also a qualified snowboard instructor and member of the Canadian Association of Snowboard Instructors. Jack is very much interested in the energy sector and excited to be part of the HEDON team.

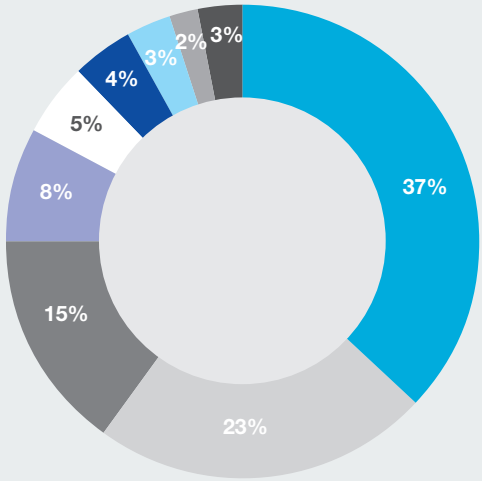

Figure 1: Global distribution of Boiling Point hardcopy readership.

Boiling Point's Readers

Boiling Point now reaches 15 000 hard copy readers in 108 different countries. Our distribution list illustrates the following:

- **37%** of our readers live in Sub-Saharan Africa (a large proportion of this figure is attributable to readers from Ethiopia, Ghana, Kenya, Nigeria, South Africa and Tanzania)
- **23%** live in the South Asia region (with a majority of this figure in India, followed by Sri Lanka and Bangladesh)
- **15%** in Europe,
- **8%** in North America
- **5%** in East Asia (the majority from the Philippines followed by Thailand, Indonesia, China, Bhutan and Cambodia)
- **4%** in the Middle East/North Africa region (including Bahrain, Egypt, Iran, Morocco, Syria and Tajikistan)
- **3%** from South America (with a majority from Brazil)
- **2%** Australasia
- **3%** other

> " Currently I am working in the field of alternative energy especially on disseminating biogas technology to households, so Boiling Point magazine I can say it, it is my school."
>
> **— Boiling Point reader, Ethiopia**

PEER REVIEWED

General

From Artisans to Entrepreneurs: Understanding the role of small business for energy access

Keywords: Energy access; East Africa; Enterprise; Entrepreneurs; Bottom of the pyramid

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Picture 1: An employee working the clay for an ICS manufacturer

The Developing Energy Enterprises Project East Africa (DEEP EA) provides a number of crucial lessons on the nature of support needed to stimulate private sector-led energy access initiatives in Africa. The project has discovered how to develop people from artisans to entrepreneurs. Throughout the project, there has been an effective non-technical shift in business performance, which (along with the technical abilities) has raised the performance of a significant number of these DEEP EA supported businesses. Overall, the project has developed a deeper and more textured understanding of the challenges of entrepreneurship in East Africa. The small and micro-business model that emerges presents a blend between certain defining features of the formal economy and other features with a distinct 'informal economy' nature. The outcome is a blend that is more in-tune with the socio-economic realities of not only the entrepreneurs themselves, but the market they service. This is where a great deal of support should be aimed if the private sector is to play its indispensable role in meeting the Sustainable Energy for All targets by 2030.

Introduction

The Developing Energy Enterprises Project East Africa (DEEP EA), which ran from March 2008 to February 2013, was funded by the European Union (EU) and the Dutch Ministry of Foreign Affairs (DGIS). The Global Village Energy Partnership – International (GVEP-I) coordinated the partnership programme responsible for implementing the project. DEEP EA aimed to increase energy access among the rural and peri-urban poor in East Africa by assisting energy entrepreneurs to grow their businesses through enterprise training, mentorship and possible linkages to finance. The project was implemented in Kenya, Tanzania and Uganda, and included three principal technologies and services: improved cookstoves (ICS), briquettes and solar PV (solar lanterns, solar home systems, and PV-based mobile phone charging).

During March 2013, Restio Energy conducted an independent terminal evaluation of DEEP EA. This article is aimed at capturing and articulating many of the lessons learnt – with the purpose of strengthening majority market energy enterprise initiatives in the future. If the private sector is to play a significant role in the drive to achieve the Sustainable Energy for All (SE4ALL) energy access targets by 2030, the support provided will have to incorpo-

Formal sector contribution	The Hybrid Model:	Informal sector contribution
Accessing loans	Sensitive to local socio-economic conditions	Under-employment
Business registration		Family & community labour
Technical standards		Locally manufactured
Business confidence		Low overheads
Value chain involvement		Low-tech approach
Personal accumulation		Community value

Table 1: Hybrid MSE Model

Picture 2: KCJ stock at an ICS business supported by DEEP EA

rate the lessons coming out of DEEP EA, amongst others, in order to improve their chance of success. The evaluation, carried out in 2013, relied on the following data collection and engagement techniques: literature review of all project related documentation; semi-structured interviews with participating enterprises (40+ across the three countries); and questionnaires administered to participating businesses (197 in total).

The project has discovered how to develop people from artisans to entrepreneurs. During a 2011 mid-term evaluation, the main challenge noted was that businesses were essentially artisanal, rather than entrepreneurial: they could make products, but they could not sell them. There has since been a profound evolution in the integration of these businesses into the market. Business owners are demonstrating products, identifying markets, issuing free samples, integrating themselves into value chains, engaging with retailers, doing direct marketing, producing and distributing brochures and pamphlets, providing after-sales service, committing themselves to product quality/standards; in short, they are selling. There has been an effective non-technical shift in business performance which (along with the technical abilities) has raised the performance of a significant number of these DEEP EA supported businesses. Overall, DEEP EA has developed a deeper and more textured understanding of the challenges of entrepreneurship in East Africa.

Understanding the contours of the opportunity

When one looks at the impact of DEEP EA from a more socio-economically nuanced perspective, it becomes apparent that many DEEP EA participants are subsistence/micro-scale farmers with an existing level of 'sustenance wealth', which offsets their absolute income requirements. Their challenge is generating enough cash as and when it is required (e.g. out of harvest time). For many, it is a case of under-employment, rather than unemployment; what DEEP EA has offered them is a part-time opportunity to generate some income and to offer it in a way that is accessible to them. About 40% of businesses interviewed during the terminal evaluation remained involved in agriculture. The opportunity therefore exists where there is already some level of economic traction; successful energy entrepreneurs are more likely to have an existing income base than none at all.

Increasing access to appropriate finance

There are a large number of businesses within DEEP EA that have accessed loans through the KIVA/GVEP-I partnership, as well as other micro-lenders such as FINCA. The manner in which these loans have been issued has been fairly unconventional, with GVEP-I standing surety for their value. To be sure, this arrangement has facilitated a greater entry of Micro Finance Institutions (MFIs) into the small-scale energy access arena, which may result in a greater level of more conventional loans being offered to the Micro & Small Enterprises (MSEs) on a business-to-business basis. GVEP-I has identified a way to offer finance on terms that are far more sensitive to the conditions of micro-enterprises. The lower interest rates offered by MFIs based on the surety provided may become the more mainstream approach, while lenders, service providers and other players establish themselves in this sector over time. Access to relatively small loans can and does make a significant difference to the performance of these businesses and the livelihoods they support.

Reliance on local labour: Family and local community

Businesses remain labour-intensive and while entrepreneurs do speak about technology efficiencies, this discourse tends not to be offered at the expense of manual labour. There is not only pride and status attached to recruiting family and community members into the business, but there is also a sense of responsibility. The notion of success has a broader, more inclusive nature as entrepreneurs talk about how success impacts/benefits others (through employment opportunities) and not just themselves. There is a tendency towards efficiencies and growth, but not in a particularly industrialised, high-tech manner.

Business registration

After the mid-term evaluation in 2011, GVEP-I decided to categorise their entrepreneurs, with category 1 entrepreneurs being the most promising and receiving a greater deal of support. Most of the Category I and II entrepreneurs are now registered business. This registration means that they can participate in public MSE initiatives and improve their prospects of accessing finance; but, just as important is the pride and responsibility that goes with it. As Joseph Roberts, a solar technician and retailer in Tanzania noted, "business registration has made me known and I need to perform better because of it". In many cases registration has the makings of a social contract between the business and the market, representing the crucial moment when an "artisan" becomes an "entrepreneur".

Technical standards

Janet Odeyo is an example of a DEEP EA-supported entrepreneur who has earnt approval from the Kenyan Bureau of Standards (KEBS) for her ICS. To date, 49 entrepreneurs have participated in the standardisation process across the three countries . While only a limited number of entrepreneurs have been able to comply with the required technical standards , it is an innovative and pioneering approach to opening opportunities for MSEs. Subsequent MSE initiatives should prioritise this process as it will open up opportunities to national and regional markets and strengthen the position and growth prospects of this sector. Many consumers make purchasing decisions based on these standards. It is an important quality intervention that offers a more consistent, recognisable standard than what can be expected by the commitment of individual entrepreneurs themselves. This is an important step in building the confidence of the market and

Country	Q15	Q16	Q17	Q18	Q19
Kenya	€ 134 032	€ 156 131	€ 188 506	€ 204 686	€ 229 346
Uganda	€ 131 106	€ 198 788	€ 265 496	€ 292 355	€ 366 004
Tanzania	€ 350 938	€ 477 201	€ 557 696	€ 693 343	€ 736 594
Totals	€ 616 076	€ 832 120	€ 1 011 698	€ 1 190 384	€ 1 331 944

Table 2 : Quarterly turnover for DEEP businesses in final quarters of the programme.

supporting institutions in the small and micro-business sector.

Business confidence

What the DEEP EA initiative has done particularly well, showing a significant improvement from 2011, is building confidence within the entrepreneurs. This included building technical knowledge, taking entrepreneurs to markets, developing business networks, encouraging entrepreneur-to-entrepreneur linkages, encouraging engagement with the value chain etc. that steadily increase the overall confidence of these entrepreneurs. During the interim evaluation, there was a patent lack of confidence which manifested itself in low sales, with most people no more than very average artisans, developing products more as a hobby than an income stream. This has changed considerably, with most entrepreneurs stating that their greatly improved sales success had much to do with their 'business confidence'.

Locally manufactured

Most of the ICS and briquette products and technologies are locally manufactured. There are of course associations/alliances between distributors (of imported technologies such as lanterns), but the bulk of the sales volumes have to do with locally manufactured products. Fifty-five percent of gross turnover value over the last three reported quarters came from ICS and briquettes which are entirely locally manufactured. In the case of ICS, the clay, moulds, liners, cladding, kiln, woodfuel, etc are all produced/sourced locally; the same can be said of briquettes, which are produced using charcoal powder (waste residue from charcoal) and/or wood-shavings/saw dust. Even the extruder technologies are locally manufactured or fabricated. The use of local materials and value adding processes has spin-offs not only for the local economy through the manufacturing value chain, but importantly pitches these business opportunities at a level which is accessible to the small/micro-business. It is not about import, freight, customs, etc. but rather about local economic transactions between local members of the value chain.

The Hybrid MSE Model

The small and micro-business model that emerges is one that presents a blend between certain defining features of the formal economy and other features with a distinct 'informal economy' nature. The outcome is something of an amalgam that is more in-tune with the socio-economic realities of not only the entrepreneurs themselves but the market they service. For instance, while there is value placed on efficiency, the strategy is more labour-intensive than 'high-tech'. While loans are offered, they are very small-scale and involve organisations and, indeed, terms that are compatible with the socio-economic realities. In terms of the different contributions the two approaches (formal and informal) make, we propose the following representation (Table 1).

While the model is interesting and has evolved – intentionally or otherwise – over the course of the project's five years, the real statement of success is in the performance and, importantly for those longer-term DEEP EA businesses, the improvement of performance over the project's life. Most businesses interviewed have increased sales and turnover remarkably over the past two years. Indeed, the increase ranges from 30% to well over a 1000% increase. The escalations appear to capture the shift many businesses have made from artisans to entrepreneurs.

Conclusion

The Developing Energy Enterprise Project East Africa (DEEP EA) has proved to be a very valuable learning experience in terms of understanding and demonstrating the important role of MSEs in the development and distribution of clean, efficient and modern energy services. To be sure, many households are now accessing modern and clean energy sources that were not before. But it is not the improved access that captures the real achievement of this programme. Instead, DEEP EA's most significant achievement is demonstrating how to develop and mobilise the MSE sector for the purpose of improving access to energy in more remote and rural areas.

The DEEP EA initiative has also, importantly, shown how to stimulate demand for energy services within the markets, building the market's confidence in new products and technologies through effectively managing the risks associated with bringing untested products to the market. These were registered businesses and not 'fly by night' operations, which used established marketing techniques which generated product knowledge within the market and which engaged with existing supply chains that were themselves favourably branded within these target markets.

It has shown that the ability and willingness to work in that awkward, but crucial, space between the informal and formal sector is essential for the success of African energy enterprises. The importance of the informal sector (primarily made up of MSEs) for the African economy cannot easily be overstated, contributing 55% of the continent's GDP and 80% of the labour force (Ncube, 2013). This is where support should be aimed if the private sector is to play its indispensable role in meeting the Sustainable Energy for All targets by 2030.

Reference

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The new Sustainable Energy for All Forum: Shaping the global energy debate

Keywords: Sustainable energy for all; Energy access; Sustainable development goals; United Nations

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Picture 1: SE4ALL: Ten years to transfom the world's energy- UN Decade of Sustainable Energy for All 2014 – 2024

Marking the two-year anniversary of the Rio+20, more than a thousand participants from governments, the private sector, civil society and international organisations gathered for the first annual Sustainable Energy for All (SE4All) Forum at United Nations Headquarters in New York. Participants shared progress on catalysing billions of dollars of investments to expand energy access to millions of people and voice strong support for a Sustainable Development Goal on energy.

Introduction

The three- day conference held close to 60 sessions featuring more than 300 speakers from all sectors of society, and from all parts of the world, including more than 20 governmental participants at a ministerial level or above. The key objectives of the first annual SE4All Forum were to:

Assess progress on Sustainable Energy for All since the United Nations Conference on Sustainable Development (Rio+20) in June 2012.

Inspire and mobilise further action, partnerships and commitments by showcasing success stories, innovation and best practices.

Grow the broader movement of civil society organisations and stakeholders by launching advocacy campaigns and outreach under the United Nations Decade of Sustainable Energy for All 2014-2024.

Shape and set the direction for the global policy discourse on energy for the next crucial decades to come.

The SE4All Forum was organised as a high-level meeting by United Nations Secretary-General Ban Ki-moon. It also marked the official launch of the United Nations Decade of Sustainable Energy for All 2014-2024, including its initial two-year focus on Energy for Women, Children and Health.

The Forum included sessions focusing on: 'Growing the Movement'; 'Catalysing Investment Through Innovative Business Models'; 'Sharing Knowledge and Experiences, Developing Capacity'; 'Acceleration Country Action'; 'Ten Years to Transform the World's Energy'; 'Global Leadership Dialogues'; and 'The Human Face of Sustainable Energy for All: Energy, Women, Children and Youth'.

On the last day, more than 60 delegations participated in a High-Level Dialogue on Energy in the Post-2015 Development Agenda. The debate showed strong support for the inclusion of energy as part of the new global development framework, including its Sustainable Development Goals (SDGs).

Going forward with the SE4All Forum

Planned as an annual occurrence, with the next event to take place during the second quarter of 2015, the SE4All Forum provides a unique global platform for all stakeholders to come together, present their work and catalyse further action,

Picture 2: SE4ALL Forum Opening Plenary (Left to Right) H.E. Mr. Olafur Ragnar Grimsson, President of Iceland; H.E. Mr. John Ashe, President of the General Assembly of the United Nations; H.E. Mr. Ban Ki-moon, Secretary General of the United Nations; Kandeh Yumkella, SRSG and CEO of SE4ALL; Chad Holliday, Chair of the Executive Committee, SE4ALL

partnerships, and commitments. As just one example of those strongly engaged, the Energy Access Practitioner Network, a SE4All partner anchored in the UN Foundation, has 1600 NGO, private sector and social enterprise members from 191 countries delivering energy services to more than 16 million households.

For all these partners, for stakeholders from all energy communities and from issue areas that have links to energy, the SE4All Forum will constitute an annual global meeting place for discussing energy solutions for the future, leveraging the unique convening power of the United Nations. The yearly global Forum is also being supplemented by other planned intermediate events, such as the envisaged African SE4All forum, which Tanzania has generously offered to host.

As already demonstrated in its first year, the Forum has the ability to unite different partners within the larger energy community. It has showed the ability to link energy closer to other related issue areas, such as food, water, gender and health. Adding to this are the activities carried out under the United Nations Decade of Sustainable Energy for All 2014-2024. The Decade has also been launched in different regions and communities around the globe, with many more such events to follow this and next year. Contributing to the preparations of each Forum are also the many activities under the SE4All initiative. These include country action agendas, investment prospectuses and gap analyses, as well as High-Impact Opportunities taken by the private sector, development partners, civil society organisations and multilateral institutions.

In sum, all of these actors, activities and achievements create a formidable global network, with the Forum as a yearly benchmark. The Forum should be a place to take stock, and to push forward. The journey towards ensuring sustainable energy for all by 2030 is a long one. However, while keeping the three long-term targets of access, efficiency and renewables solidly in place, the targets could also be supplemented by more short-term horizons for the most important steps that need to be taken next.

Key highlights of the Forum

- National action agenda and investment prospectuses for Africa, Asia and Latin American countries
- Detailed plans to mobilise over US$ 120 billion annually in support of sustainable energy for all
- Re-map 2030, charting the pathways towards doubling the renewable energy share in the global energy mix by 2030
- REN 21 2014 launch
- Poor People's Energy Outlook 2014 launch
- A Global Campaign on Energy, Women, Children and Health launch
- New initiatives and High Impact Opportunities including on Mini-Grid, Energy-Water-Food nexus, Sustainable Bioenergy
- A new SE4ALL capacity building hub hosted by TERI, India

Picture 3: Secretary-General with Advisory Board Members and High Level Delegates, SE4ALL Forum 2014

Picture 4: Tsering Choden and Tashi Palden, Manhattan Comprehensive Night and Day High School, introduced the Green Track Programme, where they build solar panels and a solar lamp, and which was a finalist for the Zayed Future Energy Prize

The new Poor People's Energy Outlook: Empowering people must be central to energy access interventions

Keywords: Sustainable energy for all; Total energy access; Household energy; Productive uses; Energy for community services; Poor people's energy outlook

The global community is increasingly shining a spotlight on energy as a key component of poverty alleviation and development efforts. Illustrative of this shift is how donors, developing country governments, civil society, and most importantly, the private sector, are all lining up to get involved in international initiatives setting their sights on energy development. However, many efforts have been unable to successfully meet the needs and wants of the energy poor. The Poor People's Energy Outlook (PPEO) 2014, launched at the UN Sustainable Energy for All Forum in June 2014, seeks to discuss and communicate these issues.

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Introduction

While renewable and decentralised energy options are receiving more interest and money than ever before, as can be said for any international development issue, what is important is that energy poverty gets the "right" kind of attention. Specifically, we must move the energy for development discussion beyond the grid-focused energy projects that for the past half century have failed to reach poor people.

Unfortunately, ministers at the last Africa- Europe Energy Partnership Ministerial in February 2014 were still calling for grid extension as their main energy development objectives. This, despite the fact that connecting rural populations to centralised grids that are slow to deploy, prohibitively expensive to install and maintain, and often unreliable, is neither feasible, affordable nor desirable as they provide minimal long-term employment and are mostly dependent on unsustainable fossil fuels.

Part of the reason such decisions are still being made is that there remains very little literature and very few organisations to inform decision-makers about alternative, affordable and quickly deployable off grid energy solutions. Another, more fundamental reason why progress is being hampered on helping the energy poor, is that most of the world still thinks of progress in terms of new connections, and not in terms of an improvement in the energy services people want and need. We need to stop talking only about quantity, and start talking about quality- about reliability, safety, affordability, and feasibility of a connection.

Poor People's Energy Outlook

For four of the past five years, Practical Action has published its Poor People's Energy Outlook (PPEO) to address precisely this issue. In the first three editions, we respectively analysed the household, productive and community energy services that poor people want and need. In our newest, fourth edition of the PPEO, we recount the main messages of the first three editions to present a robust explanation of what energy poverty really means on the ground, what poor people themselves actually want and need, and articulate holistic methods to deliver Total Energy Access (TEA), our approach to defining and measuring energy access for households, communities and for productive uses. We further present the Energy Access Ecosystem Index, which analyses the policy, capacity, and finance spaces that contribute to progress on energy poverty at a national level. Together, these topics form the basis of a revised and updated framework for scaled-up global and national action focused on what it will take to achieve meaningful sustainable energy for all.

The household level:

PPEO 2014 looks at how simple household energy services, many of which are often incorrectly considered unimportant to poverty reduction, play a key role in improving lives and livelihoods. In particular, it looks at how lighting, cooking and water heating, space heating, cooling, and information and communications services change lives, and why. The work done on household energy services draws on data from diverse national and regional reports and studies from across Africa, Asia and Latin America. Project and programme level data has also been incorporated where national or international statistics are unreliable or incomplete, as has evidence from field level interviews and focus group discussions.

For each energy service we highlight the current situation for poor people, the implications of this lack of access, and options for improving both access and the impacts of this access. A minimum standard applicable to each category of service is also suggested to achieve development benefits:

- ***For lighting:*** this is a minimum of 300 lumens for four hours per night.
- ***For cooking:*** minimum standards should include: 1 kilogram of woodfuel, 0.3 kilograms of charcoal, 0.04 kilograms of LPG or 0.2 litres of kerosene or biofuel per person per day, taking less than 30 minutes per household per day to obtain; minimum efficiency of improved solid fuel stoves to be 40% greater than a three-stone fire in terms of fuel use; and annual mean concentrations of particulate matter (PM2.5) <10 μg/m³ in households, with interim goals of 15 μg/m³, 25 μg/m³ and 35 μg/m³.

— ***For space heating:*** minimum standard for daytime indoor air temperature of 18°C. This should be achieved by means that do not entail indoor smoke, are affordable, and do not require excessive time in collecting fuel.
— ***For cooling:*** maximum apparent indoor air temperature of 30°C, and the ability to extend the life of perishable products by a minimum of 50% over that allowed by ambient storage.
— ***For Information and communications:*** people must at a minimum be able to communicate electronic information from their household, and access electronic media relevant to their lives and livelihoods in their household.

Productive uses:

The PPEO considers how, similar to the wealthiest of the world, the ability of the world's poorest to earn a living is also dependent on access to energy. Having lighting after dark to keep a shop open longer, or power for an engine to mill grain or a pump to irrigate land, can be the difference between earning a decent livelihood and remaining at or below the subsistence level and in poverty. It is this direct connection between energy and poverty reduction that is most cited in the discussion over energy poverty, but is least understood in practice. The PPEO looks at how energy interacts with four principle ways in which poor people earn a living: living off the land; running a micro or small enterprise (MSE); being employed; and earning from supplying energy to others.

— ***On living off the land,*** we focus on how improving agricultural productivity is often associated with increased energy use, and how technology justice is a key issue especially when considering that women make up the majority of agricultural labourers in Sub-Saharan Africa but have the least access to energy services. Beyond agricultural productivity, the PPEO also looks at key energy services for improving agro-processing and marketing.
— ***On MSEs,*** we consider how poor people use energy in the service, manufacturing, and processing sectors, mainly in the form of lighting, cooling, heating and cooking and water heating, but at a much more energy-intensive level than is necessary at the household level. In addition, many MSEs are mechanical processors, such as in milling grains, while others are manufacturers, both of which require significantly higher levels of power than even the aforementioned types of MSEs. The PPEO focuses on how reliability, quality, affordability, and supply adequacy are key to MSEs of all types.
— ***On employment,*** while difficult to calculate improving energy access is correlated with increases in economic growth and jobs – however the relationship is complex and increased employment is not guaranteed. The PPEO finds that electricity is consistently cited as a top constraint on enterprise growth in Sub-Saharan Africa, even when compared with issues as critical to enterprise success as access to finance and macro-economic stability. Finally, it is not the availability of a connection that "counts," but rather the negative impacts of low quality and unreliable power that matters most for enterprise success and job creation.
— ***On earning from supplying energy,*** we discuss the wide variety of ways poor people earn money via the sale of fuel, energy transition technologies, and appliances, and also of the installation and maintenance of all of these things.

Energy for community services:

The PPEO 2014 considers the multitude of benefits derived from adequate energy provision for health care (hospitals, clinics and health posts), education (schools, universities, and training centres), public institutions (government offices, police stations, religious buildings, etc) and infrastructure services (water and street lighting). Energy also plays a vital role in attracting and retaining professionals. A town may have a clinic or a school or a police station, but the reality is that professionals are often unwilling to live and work in areas without decent housing, communications and modern energy services. The lack of these professionals and the crucial services they could be providing, is a central component of why millions of poor communities remain entombed in the poverty trap today.

The concluding chapters of the PPEO 2014 bring these three key components of a Total Energy Access approach (household, community, productive uses) together to discuss the importance of an adequate definition of access. The SE4ALL goal of "universal access" is indeed commendable, but without defining what access means (does one "have access" once a solar lantern and mobile charger have been lobbed off a truck at the entrance to the village, or only once one can reliably cook on an electric skillet while running the blender and air conditioning at any given time of day?), the energy poor of the world will likely remain underserved by (although possibly "connected to") modern energy services. We present definitions for access that we feel would enable a meaningful jump up the energy ladder, and also present our energy access ecosystem index, that outlines what decision-makers must consider if they truly aim to enable rapid improvement on access: vibrant, inclusive and sustainable market systems.

The final chapter is a call, which we urge you to join, by contacting political and business decision-makers to cease focusing on large-scale infrastructure investments that cannot offer meaningful access to the poor in the medium term, and to begin promoting decentralised energy and clean-cooking solutions for poor people using a service-based, rather than supply-based approach to defining and delivering energy. This is the only way we will both deliver energy to the poor in a timely manner, and deliver the types of energy they need and want to improve their lives.

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Global Household Energy
News

Sharing the load: Public and private sector roles in financing pro-poor energy access

IIED publishes a new energy finance paper written by: Emma Wilson, Neha Rai and Sarah Best.

Increasingly the private sector is expected to finance access to modern energy services in developing countries. Yet governments and donors still have much to learn about working with business, while low-income markets are unfamiliar and risky for private investors. This report presents some innovations and challenges in financing pro-poor energy access. The need to identify those population segments (low-income, subsistence or extreme poverty) that can be reached most effectively by public, private and combined finance models is highlighted. Governments and donors should target support, incentives and policy reform to channel private investment to where it works best. This will allow them to target public finance more effectively at the poorest, who cannot be reached by market-based interventions.

Philips to establish Research & Innovation Hub in Africa

The Philips Africa Innovation Hub will work both on the creation of new inventions, as well as bringing these inventions to the market. The Hub will be located at the Philips East African Headquarters in Nairobi, where African talents and international researchers will operate on the concept of "open innovation" and will work in close collaboration with the R&D ecosystem of Kenya and Africa. Philips has designed and is manufacturing an innovative smokeless cookstove to improve the lives of those who rely on wood or biomass for their daily cooking. These specially designed stoves are extremely efficient and significantly reduce the use of wood as fuel. The cookstove can reduce smoke and carbon monoxide emissions by more than 90% compared to an open fire thus reducing the health risks of indoor cooking. The contribution of the innovation hub is to create new go-to-market models for these stoves.

Biomass Waste-to-Energy Toolkit for Development Practitioners

Available online, this toolkit has been developed by SNVs REDD+ Energy and Agriculture Programme (REAP). With the purpose of supporting development practitioners, this toolkit does not promote a one size fits all approach. Instead it provides practitioners a waste to energy project with a focus on the use of agricultural and forestry waste for the generation of electricity, by using technologies including combustion, gasification and anaerobic digestion.

IDB launches new Energy Innovation Centre website and interactive database

The Inter-American Development Bank has launched its new Energy Innovation Center website featuring an interactive energy database, nicknamed 'the Database for the 21st Century'. It incorporates Linked Open Data and presents energy production and consumption information by country and year in a way that is innovative and user-friendly.

The second annual SE4All Forum, May 2015

Following the first Forum in June this year, the second annual United Nations Sustainable Energy for all Forum will take place during the week of 18-22 May 2015 at the United Nations Headquarters in New York City. Visit se4all.org or email forum@se4all.org if you have any inquiries.

Call for papers

Boiling Point forthcoming topics:

— Building Inclusive Energy Markets
— Women, Energy and Economic Empowerment

Boiling Point is peer reviewed and published quarterly. We invite readers to submit articles, papers and news on a rolling basis at any time. So if you feel that you have something to contribute to the wider household energy community on any theme, including the above four, then please read the information below and send us your experiences – HEDON would love to hear from you!

Boiling Point looks for articles which are written in English, preferably using clear and plain language, and which can be used by other people in their own work. Do not be deterred, however, if you are not used to writing – it is the information that is important – we will review articles, edit them and return them for your approval prior to being published.

Theme articles

Each edition of the journal typically contains four to six full length theme articles which can include research papers and programme reports that are relevant to the theme topic. We encourage you to submit articles on your work on any of the above-mentioned themes at any time of the year. Each edition also contains a related Toolkit. If you are interested in contributing to these, then please contact us on the email address at the end of this page.

Viewpoints

If you feel you or someone from your organisation should be interviewed on your work in facilitating access to energy for households in developing countries, please contact us. All interviews will be published on the HEDON website and the best will be selected for publication in the Viewpoints section of Boiling Point.

General articles

We welcome submission of general articles at any time, which can cover any topic. Examples include project/programme updates, technical papers, book/report reviews, and conference and workshop reports. Please note: technology based articles should be focused on the real life application of proven technologies.

Helpline

Would you like advice from experts on an aspect of your work in household energy? Contact us with your questions and we will strive to direct you to those who can help. Questions we feel are relevant to a wider audience are selected for publication in the Helpline section of Boiling Point. In the past, these have included dilemmas regarding marketing, emergency relief and enterprise development.

Sponsor

Boiling Point reaches over 11,000 readers globally, making it an ideal forum to get information about your project activities out to the worldwide community of practitioners and to showcase your work to potential collaborators and funders. Sponsoring Boiling Point gives your organisation a range of profile benefits; from space in the journal to communicate news, events, logos and website links; to receiving several printed copies to distribute to your colleagues. For more information, visit www.hedon.info/EYQB or send us an email.

Front cover photo competition

HEDON is offering you another fantastic opportunity to get your best image onto the front cover of Boiling Point. We are looking for a full colour photograph for the front cover that illustrates the future themes of Boiling Point. The photo must be: of good quality format and suitable for high resolution colour printing (minimum resolution of 300 dpi and a high quality file type i.e. not .bmp); sent to us in its original format (not pasted into an MS Word file); credited to the correct person, with a caption if appropriate; owned by the person/organisation entering the competition; and preferably with a central focal point, bold composition and rich colours. The editor's decision is final and the selected photo will win absolutely nothing, apart from the admiration of thousands of subscribers and of course our thanks.

Guidelines and submission dates

We are now accepting articles and front cover photo submissions for BP65: Building Inclusive Energy Markets. Deadline for submission is Sunday 18 January 2015 (visit www.hedon.info/boilingpoint).

Articles should be submitted via email to boilingpoint@hedon.info. Articles should be around 2000 words in length. Illustrations, such as drawings, photographs, graphs and bar charts that are essential, and all references should follow the given guidelines. Articles should also include a 100-200 word summary, a 50 word profile for each author and up to ten keywords that you feel best describe your article. Files can be emailed to the editor at the below listed address. Final selection is based on article quality, originality and relevance.

Thank you for your cooperation, and please do not hesitate to contact us for any clarification.

Regards,
The Boiling Point Team

Email: boilingpoint@hedon.info

Boiling Point.

A PRACTITIONER'S JOURNAL ON HOUSEHOLD ENERGY, STOVES AND POVERTY REDUCTION

The HEDON Household Energy Network is dedicated to improving social, economic and environmental conditions in less developed countries, through promotion of local, national, regional and international initiatives in the household energy sector.

The HEDON Household Energy Network is established in the UK as a charitable limited company registered with the UK Charity Commission.
It is managed by seven Trustee Directors: Grant Ballard-Tremeer (Eco Ltd), Andrew Barnett (The Policy Practice), Raffaella Bellanca (SNV), Jack Dedman (Chartered Accountant), Ben Garside (International Institute for Environment and Development), Dick Jones (Independent) and Kavita Rai (Energy Specialist) and is coordinated by Karima Hirji (HEDON Executive Manager) and a team of dedicated volunteers. The network itself is comprised of thousands of active members with diverse backgrounds: practitioners, policymakers, academics, business owners and non-governmental organisations, based across the world. We exchange experiences, learn from one another and create new knowledge.

Our Vision

A world where everyone has access to clean and sustainable energy; in fairness, respecting the environment and combating climate change.

Our Mission

To inform and empower practitioners in order to unlock barriers to household energy access by: addressing knowledge gaps, facilitating partnerships and fostering information sharing.

Our Patrons

HEDON Household Energy Network has the good will and support of two patrons: Archbishop Desmond Tutu of South Africa, and Professor Kirk R. Smith, Professor of Global Environmental Health, at the University of California, Berkeley, USA.

"As a patron, I believe that HEDON, in its work to address energy and climate improves lives for people living in poverty. I am a supporter of their work and would recommend others to support their endeavours further"
Archbishop Desmond Tutu

"HEDON is the oldest international network of organisations promoting clean and efficient household energy sources for improving health and welfare. I have been involved since its inception in the 1980s and it has provided both intellectual support and inspiration in my work to understand the health and climate implications of household combustion"
Professor Kirk Smith

What the HEDON Household Energy Network offers:

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